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# Journal of Special Operations Medicine

**A Peer Reviewed Journal for SOF Medical Professionals**

**Dedicated to the Indomitable Spirit & Sacrifices of the SOF Medic**

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# COVER

The father, said after his daughter was treated at the clinic, in Konar Province, Afghanistan, “Right now I feel like I'm in America, I'm so happy.” The Special Forces medic that treated her said that it’s feedback like this that keeps him going. See complete article on page 68.

SFC Michael O’Perkins examines the eyes of a elderly male from the Kuchi Tribe near Gardez, Afghanistan. Perkins, a 18D, provides medical care to Afghan tribesmen in support of the Combined Joint Civil Military Task Force.
*Photo by SFC Larry Johns*

## From the Editor

**The Journal of Special Operations Medicine is an authorized official quarterly publication of the United States Special Operations Command, MacDill Air Force Base, Florida. It is not a product of the *Special Operations Medical Association (SOMA)*. Our mission is to promote the professional development of Special Operations medical personnel by providing a forum for the examination of the latest advancements in medicine.**

**DISCLOSURE STATEMENT: THE VIEWS CONTAINED HEREIN ARE THOSE OF THE AUTHORS AND DO NOT NECESSARILY REFLECT THE OFFICIAL DEPARTMENT OF DEFENSE POSITION. THE UNITED STATES SPECIAL OPERATIONS COMMAND AND THE JOURNAL OF SPECIAL OPERATIONS MEDICINE DO NOT HOLD THEMSELVES RESPONSIBLE FOR STATEMENTS OR PRODUCTS DISCUSSED IN THE ARTICLES. UNLESS SO STATED, MATERIAL IN THE JSOM DOES NOT REFLECT THE ENDORSEMENT, OFFICIAL ATTITUDE, OR POSITION OF THE USSOCOM-SG OR OF THE EDITORIAL BOARD.**

**Articles, photos, artwork, and letters are invited, as are comments and criticism, and should be addressed to Editor, Journal of Special Operations Medicine, USSOCOM, SOC-SG, 7701 Tampa Point Blvd., MacDill AFB, FL 33621-5323. Telephone: DSN 299-5442, commercial: (813) 828-5442, fax: -2568; e-mail JSOM@socom.mil.**

**All scientific articles are peer-reviewed prior to publication. We have applied for an International Standard Serial Number (ISSN) with the Library of Congress and we’re checking into selection for Index Medicus/MEDLINE. The Journal Of Special Operations Medicine reserves the right to edit all material. No payments can be made for manuscripts submitted for publication. Published works may be reprinted, except where copyrighted, provided credit is given to the Journal of Special Operations Medicine and the authors.**

**There are several ways for you to obtain the Journal of Special Operations Medicine (JSOM). USSOCOM-SG distributes the JSOM to all our SOF units and our active editorial consultants. We can also email you the JSOM PDF; if you would like to be added to the PDF list please send your request to me at JSOM@socom.mil. However, keep in mind that the PDF ranges 3-4MB and is rejected due to size by most AOL, Yahoo, and Hotmail accounts. Make sure the address you give me can handle it.**

**SOMA members receive the JSOM as part of membership. Please note, if you are a SOMA member and are not receiving the subscription, you can contact SOMA through www.specialoperationsmedicalassociation.org or contact MSG Russell Justice at justicer@soc.mil. SOMA provides a very valuable means of obtaining CME, as well as an annual gathering of SOF medical folks to share current issues.**

**For JSOM readers who do not fall into either of the above mentioned categories, we have arranged for the JSOM to be available as a paid subscription from the Superintendent of Documents, US Government Printing Office (GPO), for only $30 a year.**

**Don't forget, we are also online through the Joint Special Operations University to all DOD employees at http://www.hurlburt.af.mil/jsou. On the left you will have several tabs; you must first “log-in” and then go to “publications.” Scroll down until you get to the JSOM and click on the picture. From this site, you can link straight to the Government Printing Office to subscribe to the JSOM. We are working with the JSOU to have a SOCOM-SG medical site. CAPT Butler will address this in the Winter Ed of the JSOM and we will keep you posted as that progresses.**

**We are now into our fifth year of publication and continue to need your article submissions and photos. They are what keep us going and they're what makes this journal so unique. It is a sharing of your lives and missions as you go forth as instruments of national foreign policy. We can't do it without your input; you are what the journal is all about!**

**The JSOM remains the tool that spans all the SOF services and shares medical information and experiences unique to this community. The JSOM continues to survive because of the generous and time-consuming contributions sent in by physicians and SOF medics, both current and retired, as well as researchers. We need your help! Get published in a peer-review journal NOW! See General Rules of Submission in the back of this journal. We are always looking for SOF-related articles from current and/or former SOF medical veterans. We need you to submit articles that deal with trauma, orthopedic injuries, infectious disease processes, and/or environment and wilderness medicine. More than anything, we need you to write CME articles. Help keep each other current in your re-licensure requirements. Don't forget to send photos to accompany the articles or alone to be included in the photo gallery associated with medical guys and/or training. If you have contributions great or small… send them our way. Our E-mail is: JSOM@socom.mil.**

**WHAT’S NEW -- We are now serial indexed with the Libary of Congress and are awaiting approval of our application to be indexed with the National Library of Medicine. If we are approved, and I feel confident that we will be, the JSOM will be searchable in MEDLINE.**

**Don't forget to do your CMEs!!!! The JSOM's CMEs are for our SF medics, PJs, and SEAL corpsmen as well as physicians, PAs, and nurses. We offer them to you in coordination with the Uniformed Services University of Health Sciences (USUHS).**

**Enjoy this edition of the journal, send us your feedback, and get those article submissions in to us now!**

**Maj Michelle DuGuay**

# From the Surgeon

Frank Butler, MD
CAPT, USN
HQ USSOCOM Command Surgeon

Hope that everyone had a good holiday season and is ready to pick up the load again in the New Year. Special thanks to all of our deployed SOF forces who never got to put their load down during the holidays.

**Kudos**

Our office said good-bye to two of our teammates in the past several months. COL Scott Heintz retired from the military after 26 years of service. Scott is leaving to take advantage of a great job opportunity working here in Tampa for the Army Medical Department. LTC Will Schiek was selected to command a medical battalion in the Fourth Infantry Division at Fort Hood, TX. Scott and Will are both great officers and their professional talents and positive attitudes will be sorely missed in the office.

Lt Col Jim Lorraine will be replacing COL Heintz as the Deputy Surgeon. Jim has just returned from a deployment to Iraq with one of our Special Operations Task Forces. His knowledge of medical planning, budget, and manpower issues is legendary around USSOCOM and he will do great things in the Deputy Surgeon job.

Congratulations to the co-winners of the first USSOCOM Surgeon's Award, COL John Holcomb and SFC Dom Greydanus of the Army Institute for Surgical Research. Job One for SOF medicine in the Global War on Terror is to make sure that our combat medics have all of the combat trauma training and equipment that they need to go to war. COL Holcomb and SFC Greydanus have had remarkable success with the Biomedical Initiatives Steering Committee-funded pilot program that is developing methods to fast-track new training and technologies to our deploying SOF units. This effort has been up and running since September, has already trained six deploying SOF units, and has eight more on the books in the first few months of 2005. Thanks to the efforts of these two individuals, the feedback from the deploying units who have been trained with this initiative has been overwhelmingly positive.

Kudos also go to COL Al Moloff and Dr. Dale Hamilton for another great Special Operations Medical Association (SOMA) meeting in Tampa this past December. Our Deputy Commander, VADM Eric Olson welcomed the attendees during the opening session and we were honored to have both the Surgeon General of the United States, VADM Rich Carmona, and the Surgeon General of the Navy, VADM Don Arthur, as speakers at the meeting. It's worth mentioning that both VADM Arthur and VADM Carmona have played key roles in ensuring that our SOF combat medics are ready to go to war. VADM Arthur and BUMED are funding the Committee on Tactical Combat Casualty Care, which is run by the Naval Operational Medical Institute. This committee is charged with making sure that our combat casualty care techniques and equipment keep pace with all of the latest advances in battlefield trauma care. VADM Carmona is an active member of this committee and recently spent a day at one of its meetings in San Diego helping to make sure that we get these guidelines right. Thanks to both of these individuals and to all of our medical colleagues in the Army, Navy, and Air Force who have helped to support our Special Operations forces.

Lastly, thanks to our hard-working editor of the Journal of Special Operations Medicine – Major Michelle DuGuay. She has made a number of excellent innovations to the journal recently, including increasing the number of journals published so that we can mail copies directly to our deployed SOF units, applying for the JSOM to be indexed both in the Library of Congress and the Library of Medicine, and adding an abstract section to the journal. The first abstract section appears in this edition of the journal and will help us to highlight items of interest to SOF medicine from the medical literature.

**SOF Medical Web Site**

So, everybody else has had a web site for years. How come SOF medicine doesn't? Good question – the long answer includes computer security issues, funding, and finding someone to take ownership of the site. We are currently in the exploratory phase of launching a SOF medical website. It has been difficult to get the JSOM and other items of medical information out to all of our deployed forces around the world. The SOF medical web site will enable our combat medics to have access to the medical information they need anywhere in the world that they can get onto the internet. There is also a need to develop a distance learning capability to help sustain the knowledge that SOF combat medics receive in the SOCM course. We have gotten great support from the Joint Special Operations University (BG Paulette Risher, Lt Col John McAtee, and Major Cheryl Magnuson) on this initiative and the SOF medical web site will be a reality in the near future.

**SOF Combat Casualty Reports**

I hope that all of you who attended the SOMA conference got a chance to go to the excellent Operation Iraqi Freedom/Operation Enduring Freedom forum put on by SGM Harold Hill and MSG Corey Russ from USASOC. This was one of the highlights of the meeting and a great example of what we need more of at future meetings. Our operators are coming back from the war with experiences and observations that need to be shared with the rest of the SOF medical community. I hope that this type of forum is a regular feature in future SOMA meetings and that these two individuals and the other senior combat medics in SOF continue to let us know what works and what doesn't downrange. Inevitably, however, not everyone with a story that needs to be told will make it to SOMA. We need another way to get the word out. It's the goal of this office to capture the lessons learned from all of our serious SOF combat casualties. In the past, security concerns have kept many operators from sharing their experiences. We need to find a way to get past this. From the standpoint of capturing the lessons learned, we don't care too much about the "who, where, and when" that make an event classified, but we do need the "what" and the "how" – both tactical and medical details – as well as how the care provided worked in taking care of the casualty. SFC Dom Greydanus will be working with the units participating in the Tactical Combat Casualty Care Transition Initiative to capture their input on how the new training and technologies are working and what needs to be changed. Another way to get your story on the record is to send it to LT Shawn Wood at USSOCOM. LT Wood's classified e-mail address is Shawn.Wood@hq.socom.smil.mil. We will scrub the information that comes in for security issues before it goes any further. A third option is to discuss the casualties in the SOF Med Truth surveys when you next attend Special Operations Combat Medic sustainment training. Current plans are to share the lessons from these scenarios through the TCCC Transition Initiative and other appropriate SOF educational venues. One example of a casualty scenario with a point for all SOF combat medics came to light at SOMA. Remember the warnings about intubating casualties on the battlefield? The concern was that the white light from the laryngoscope would expose the first responder to an unacceptable increased risk from hostile fire. This has now happened in one casualty scenario presented at SOMA. The first responder was fatally shot in the head during the attempted intubation. The lessons are out there – we need to make sure that we capture them and put them out to all of our SOF combat medical personnel. Get the word back to SFC Greydanus or LT Wood so that we can continue to get smarter in this area.

Our country is winning the war on terrorism and that's due in large part to the efforts of many of the warriors reading the JSOM. God bless you and God bless America.

# ENLISTED CORNER

SENIOR ENLISTED MEDICAL ADVISOR (SEMA)
HMCM GARY WELT


Well, what a year 2004 has been! Great job by ALL! By the time this reaches you, we will be well into the New Year. I hope and trust that all of you had a great holiday season, regardless of where you may have been. Things here at the HQ are as hectic as ever and there appears to be no slowing down in the near or distant future. Let me cover a few items of great positive note.

SOMA this year was, as usual, outstanding. This year brought more enlisted speakers than in years past and the lectures are getting more operationally focused. This is a tribute to the undying dedication of our SOF medical brethren to share their operational skills, knowledge, and experience throughout the force. SOMA also recognized three of our brothers as the SOF Medics of the Year. Congratulations to all three of them! They are:

| | |
|---|---|
| ***USASOC*** | ***SSG David Glenn*** |
| ***AFSOC*** | ***TSgt Matthew Wells*** |
| ***NAVSPECWARCOM*** | ***HM1 Dale Wooden*** |

I encourage all of you to attend next year's conference as it will only get better with your attendance and participation as guest speakers.

The Tactical Combat Care (TCCC) Transition Initiative has gotten off to a great start. To date, SFC Dom Greydanus and his crew have trained over seven deploying operational units from Washington state to Germany. The feedback during and following the courses has been outstanding, but everyone said it could use some more hands-on and scenario-based training. The suggestions, comments, and recommendations that have been submitted by the participants are immediately reviewed and taken into consideration for placement into the next course.

Just recently, several medical professionals of the SOF medical community and the U.S. Army Institute of Surgical Research (USAISR) got together in Pensacola, Florida, for a meeting sponsored by the Naval Operational Medicine Institute (NOMI) to revise the current course based on YOUR valuable input. Seven personnel worked for three very long days, and consumed six dozen doughnuts and 12 pots of coffee to ensure that the material presented during this program was correct, concise, and completely up to date as of mid-January 2005. We developed several recent "real world" medical training scenarios of actual combat medical related treatment, designed to make the non-medical operator as well as the team medic exercise his baseline knowledge and skills. We also have split the presentations for the medics and operators into two separate lecture programs as not to bore either group, nor waste their time reviewing medical issues that don't apply to them. We are also investigating the production of a basic pocket reference card to outline the three phases of TCCC, the treatment guidelines, specific instructions for utilizing life saving equipment issued prior to deployment, and the CASEVAC "rules of thumb" to include the 9-Line CASEVAC format. All of these new innovations are in direct response to the operators' requests from the ground level. Preliminary reports from the battlefield are indicating a dramatic DECREASE in pre-hospital deaths, which means the men and medics are doing what it takes to keep their buddies and fellow soldiers alive and that we are on the right track with this program. Keep up the great work and keep saving lives!

Now, with all that being said, I have a few very important questions that again require the forces' direct input. It is no secret that we as enlisted Special Operations medics are a breed of professional Soldiers,

Sailors and Airmen that are highly trained, tested, and evaluated constantly as we do our jobs, both in garrison and on the battlefield. We are a high maintenance group that must recertify on a regular basis to refine and maintain our unique skills. In my opinion, no other MOS, NEC, nor AFSC in SPECOPS, that I am aware of, requires a license or certification to do their job. This alone makes us a target of opportunity for the team commander, team sergeant or platoon chief when it does come time to recertify. I believe we need to better educate our teammates on just how important our job is. So, with a little plagiarizing from General Brown's SOF Truths, I would like you to help me remind our leadership of the SOF Medical Truths:

**SOF MEDICAL TRUTHS**

1. Humans Are Our Hardware
2. You Bleed Just As Much In Peace As You Do In War
3. Quantity Is No Substitute For Quality Medical Care
4. Sof Medics Must Be Totally Competent Always
5. Sof Cannot Be Mass Reproduced

With these in mind and your continuing outstanding performance, we should be able to justify to our leadership the requirement of recertification. "*Drive On*"

Your input as the "Operators" for SPECOPS medicine is invaluable, and if I may be so bold, inevitable! Therefore, the Joint Medical Enlisted Advisory Council (JMEAC) needs your input. The JMEAC is your direct line to address specific service or joint related medical operational and training issues to your individual senior enlisted medical advisor (SEMA). However, I am going to take this opportunity to elicit individual specific responses from you, the operator. It is my intention to give you an opportunity to ask questions and provide direct input and recommendations to me as the SOCOM SEMA. So, I will ask of you the following questions and will expect of you a professional response to me directly by e-mail with your specific service SEMA in the CC line. Please forward your comments and responses to my e-mail at: weltg@socom.mil.

1. What can the USSOCOM Surgeons office do to better assist you to do your job?
2. Where do you think SOF medicine will be in the next five to ten years?
3. What suggestions do you have to improve SOF medicine?
4. What would you do to keep SOF medics in the operational force longer?
5. What will it take to keep YOU for the next 6 to 10 years?

These may seem like simple questions, but I need your response to help the JMEAC make recommendations on the enlisted vision of SOF medicine to the Command Surgeon. My responsibility is to YOU, the SOF medic on the ground! The backbone of all the military services and SOF is the enlisted force. You are recognized as the healer of that backbone. Maintain its strength through your professionalism and vigilance!

In closing, no amount of words can express the undying devotion to duty, countless casualties, and the truly heartfelt sorrow you deal with on a daily basis. To be responsible for the saving of lives of your friends, fellow teammates and all others who cross your path in a time of need is, by far, the most awesome responsibility that can be bestowed on the SOF medic. The USSOCOM Surgeon and I, and I'm sure, the entire SOF community, wish to express our sincere gratitude for the outstanding job that each and every one of you has done in the past and will continue to do in the future as we continue to win the Global War on Terror. So, until I see you in some far off distant sandy hot nasty place, remember……

**"AMERICA WILL NEVER RUN…..AND WE WILL ALWAYS BE GRATEFUL THAT LIBERTY HAS FOUND SUCH BRAVE DEFENDERS"**

**PRESIDENT GEORGE W. BUSH**

# *Meet Your JSOM Staff*

**EXECUTIVE EDITOR**

Frank K Butler, MD

Butlerf@socom.mil

CAPT Frank Butler graduated from Basic Underwater Demolition/SEAL training in 1972 as a member of Class 64 and subsequently served as a platoon commander in both Underwater Demolition Team Twelve and SEAL Team One. After attending medical school at the Medical College of Georgia, he did his internship in Family Practice at Naval Hospital Jacksonville. CAPT Butler spent five years as a Diving Medical Research officer at the Navy Experimental Diving Unit in Panama City, where he helped to develop many of the diving techniques and procedures used by the Navy SEAL teams today. He then did a residency in Ophthalmology at the National Naval Medical Center in Bethesda, where he was Chief Resident in 1989. CAPT Butler was then assigned to the Naval Hospital Pensacola where he was Chief of Ophthalmology from 1989 to 1994. He assumed the duties of Director of Biomedical Research for the Naval Special Warfare Command in 1989 as well. He was transferred to his current position as Command Surgeon, US Special Operations Command, in March 2004.

**MANAGING EDITOR**

Michelle D. DuGuay, RN

Duguaym@socom.mil

Maj DuGuay joined the Army Reserve in 1987 and served as a nurse in a Combat Support Hospital unit for three years before switching services in 1990 to become an Air Force C-130 Flight Nurse. She is currently an IMA reservist attached to the SOCOM/SG office where she is in charge of management, production and publication of the JSOM. Maj DuGuay has a Bachelors in Nursing and a Masters in Business Administration/Management. Her career includes being a flight nurse in both the military and private sector, 15 years of clinical experience in emergency and critical care nursing as well as being an EMT and a legal nurse consultant. She also served as the military liaison to her Disaster Medical Assistance Team (DMAT.) Prior to the SG office, Maj DuGuay's experience at USSOCOM includes an assignment in the Center for Force Structure, Resources, Requirements, and Strategic Assessments.

**SENIOR EDITOR**

Warner J. Anderson, MD

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COL Anderson enlisted in 20th SFG(ABN) in 1965 and separated in 1972 as SFC, MOS 12B4S (SF Engineer) and 91B4S(SF Medic). He received his Bachelor of Science in Psychology and PA certificate in 1975. He obtained his MD and PhD in medical anthropology at the University of Florida. COL Anderson is board certified in Internal Medicine; his experiences include primary care, critical care internal medicine, and Chief of Emergency Medicine. He was Chief of Internal Medicine for the 344 MASH, USAR, 1990 to 1993; Battalion Surgeon, 2/12 SFGA, 1993 to 1994; Group Surgeon, 19th SFGA, 1994 to 2000; HHC, USACAPOC Public Health Team Chief, 2000 to 2001; EMS Medical Director for three EMSs; and a member of New Mexico State EMS Licensing Board until mobilized Jan 2002. COL Anderson is the Associate Dean (Army), Joint Special Operations Medical Training Center, USAJFK, Special Warfare Center and Schools, Ft Bragg, NC.

# Contents

*Winter 05* *Volume 5, Edition 1*


# USASOC

Rocky Farr, MD
COL, USA
Command Surgeon

I write this while on leave between Christmas and New Year's after the U.S. Army Special Operations Command's Surgeons Conference (11-12 December) and the Special Operations Medical Association conference (SOMA) (13-17 December) both held in Tampa, Florida.

The U.S. Army Special Operations Command's Surgeon's Conference was well attended and turned into a marathon event on Saturday because so many units briefed their fellow Soldiers about their significant events. We had great participation from all the Special Forces groups, the Rangers, the SOAR(A), and our reserve component brethren, both National Guard and Army Reserve. Saturday is always the best day for me as I get to hear all the stories from "summer vacation." A large thank you to all the presenters, too numerous to mention. In notable attendance was 18D SSG Glenn (more about him later); Colonel Chris Blunden, my counterpart/equivalent in the South African Medical Services (7th Medical Battalion Group, Commanding); and Colonel Andreas Stettbacker from the Swiss Special Forces. Most all of the office personnel came down except for LTC Newton who goofed off in SERE school at Fort Bragg while the rest of us labored at the bar in Tampa. Frank is bound to 1st SFG(A) to be their group surgeon next summer.

Sunday is my office's day to present current issues, policies, problems, and solutions, and, in general, harangue the troops about what we had to deal with on their behalf over the last year. Captain Michael and SFC Blunden from Major Sully's *most excellent* Medical Logistics shop received high praise, both Saturday and Sunday, for all the support they provided deploying Soldiers and units. I wholeheartedly second those comments. A job very well done! The briefers from the DCS, Surgeon, and USAJFKSWCS covered various subjects: the JSOMTC, LTT, medical logistics, medical operations and intelligence, diving medicine, aviation and military freefall medical support; in other words, the usual suspects. MSG Thompson, our USASOC LNO at Walter Reed Army Medical Center came down to brief us on ARSOF casualty tracking and management. He's a great asset to have walking the wards up there in D.C. and working for the USASOC G-1. Also, for the first time we had the Theater Special Operations Command Surgeons in attendance; both the SOCEUR Surgeon (LTC Benson) and the SOCCEN Surgeon (MAJ Burlingame) came and added much to the proceedings. Kudos to SFC(P) Allen for running things under MSG Rodriguez's supervision. I think these briefs will end up on the USASOC Surgeon's web page for those not in attendance.

I thought SOMA was a great meeting with many more of the lessons learned sessions that we all like and all need. Corry Russ and some of his henchmen presented a morning breakout on medics in combat, combat wounds, and actions on the objective. It was all first rate information presented in a very professional manner by Soldiers who had been on the ground in the thick of it. I think it was the best SOMA session in some years and hope it will continue as a series as long as we are in this war.

The SOMA Board of Directors met and one of the issues discussed was the percentage of enlisted speakers versus officer speakers at the annual meeting. I think we had more NCOs speak this year than last. In an effort to continue this trend I might fund some ARSOF NCO speakers to SOMA next year if I see and like the proposed presentations and their command won't send them. It's great to have Colonel Al Moloff as the SOMA president. I think Al will take the organization forward in great ways. If you have any suggestions on SOMA changes or improvements, please pass to Al, Sammy, or me.

*SSG Glenn, center with his wife Robin and COL Farr. Picture was taken at the USASOC Surgeons Conference.*

Tuesday night was "mess night" and all had a good time. SOMA presented the ARSOF Medic of the Year to SSG David Glenn from 3rd SFG(A) with his entire team in attendance. SFC Glenn from SSG Glenn's team described his deeds on the battlefield to us. We managed to spring SSG Glenn and his wife, Robin, from Walter Reed Army Medical Center to fly down to attend the conference and receive the award and then get to Fort Bragg the next day for the 3rd SFG(A) winter formal. Also at mess night, several anciently old SOF warriors were presented the SOMA saber: MSG (Ret) Mike Brochu, MSG Russ Justice, and me. I always thought one had to be either retired or dead to get one; I'm busy deciding which one I am.

The best parts of SOMA were the same as always. Talking in the halls, bars, and rooms with fellow warriors doing that networking thang. It was great to see folks that hadn't been able to attend in several years due to deployments, assignments, wounds, or whatever. Do plan to try to attend next year.

January marks the beginning of the AMEDD officer assignment season. I find myself in the luxurious position of having ten or so applicants for each slot and very, very few battalion slots opening up. All the serving battalion surgeons are clearly having too good a time to leave and return to the AMEDD and fixed facilities. I have a whole group of eager graduating resident physicians who I have to tell to wait until 2006 for possible assignments. It pleases me to see the quality that we are getting and the fact that folks are returning for second and third assignments. Several medical officers, now becoming senior officers, have assignment experience in Special Forces, Rangers, JSOC, SOF aviation, and/ or SMUs. This breadth of experience, until now quite rare, makes me hopeful that some eager studs will come fill my position, the Dean at JSOMTC, or the Surgeon in Tampa.

All this good time, beer, and comradery does not alter the fact that two plus groups, a couple of regiments, and other SOF forces are still decisively engaged at war. On the last day of the meeting, I went to the USSOCOM Biomedical Initiatives Steering Committee (BISC), a group that looks at research efforts and new equipment. The BISC lately has ventured into just-in-time training through the Institute of Surgical Research (ISR: "The Burn Unit") at Fort Sam Houston. If you have a unit deploying, it might be worthwhile to take a look at this training opportunity and contact my training folks about using this traveling team. They bring the latest toys and information and train both non-medics and medics.

Edward Woods, MD
CAPT, USN
Command Surgeon

U.S. Special Operations Command (USSOCOM) will employ the High Speed Vessel (HSV) during a proof-of-concept deployment aimed at assessing the utility of the ship as a long range, intra-theater mobility and sea basing platform as well as a highly mobile, rapid response SOF craft.

*File photo of HSV-1 Joint Venture*

One of the first challenges for this platform was to configure the medical spaces and provide the necessary AMAL to care for the ship's crew and then find the money to fund the project. Well, we overcame the first hurdles with final approval of design specs and the Authorized Medical Allowance List (AMAL) with full funding for both. Sustainment costs will be funded through the ship's operational target (OPTAR) working through the supply officer (SUPPO).

I was fortunate to meet the prospective Independent Duty Corpsman for HSV-1, HMCS Mark Stone, at WARCOM on his way back to Hawaii. He is enthusiastic about embarking on this pioneering mission to set high standards for those who follow in his footsteps. As the senior enlisted on board he will be given the opportunity to hone well-established leadership skills in addition to being the ship's "Doc."

I recently returned from a two-day medical limited objective experiment (LOE) on board the sister vessel, HSV-2 SWIFT, leaving from the Naval Surface Warfare Institute in Panama City, FL. I wanted to get first hand knowledge of the layout and capabilities of this platform and was fortunate enough to get an invite from the LOE OIC, CAPT Sara Marks from the Naval Warfare Development Command, Newport, RI. The following is a brief synopsis of my observations from the trip.

The primary purposes of the event were to evaluate the HSV for stability factors in rendering life saving resuscitative procedures and to make recommendations for future HSS LOEs and engineering designs of future HSVs. A summary of the LOE includes: medical configuration of the HSV, in-transit patient care requirement, operational employment of the en route care team, receipt and decontamination of CBR exposed patients, high/low-speed transit effects on personnel and equipment, and characteristics of vessel operations in extreme environments.

The isolation shelters proved to be valuable treatment/holding facilities for mass casualties where the working environment was controlled for both patients and providers. These shelters mitigated noise levels inside the Mission Deck, allowing providers to hear vocal commands during potential trauma care situations. Pre-positioning only one of these shelters in the Mission Deck would provide a valuable capability for multi-

ple health service support missions. Not only could it function as a holding facility but also provide critical en route care capabilities with adequate base operating support equipment. Stability was an issue when standing in the Mission Deck during normal and high speed evolutions. This may affect the level of en route care rendered, severely limiting the complexity of procedures. Securing casualties to litters through various means is paramount to their safety as well as facilitating proper care by qualified providers. Patient movement from the helo deck and throughout the ship was not tested. The ship is adequately configured to handle such movements with proper planning and support. En route care for CBR casualties was successfully tested with DECON station set up and operation in addition to using a hardened tent structure for treatment. The portability of these structures makes them an ideal choice for storage and use aboard this platform. Other medical systems tested proved to function properly in ideal conditions with some needing ship's power to operate. This may be a concern if operational tempo does not allow for dedicated power during tactical situations.

*Briefing inside the Base-X CBR treatment tent*

Technology is changing at a pace that requires continued testing of innovative medical systems for experimental platforms such as HSV to support the line commanders' requirements for HSS. I will actively participate in future LOEs to evaluate these emerging systems for maritime adaptability as the Navy pursues a growing strategy for sea basing capabilities as indicated in the following CNO excerpt from Seapower 21.

*As enemy access to weapons of mass destruction grows, and the availability of overseas bases declines, it is compelling both militarily and politically to reduce the vulnerability of U.S. forces through expanded use of secure, mobile, networked sea bases.*

*Sea Basing: Action Steps*
*Exploit the advantages of sea-based forces wherever possible*
*Develop technologies to enhance on-station time and minimize maintenance requirements*
*Experiment with innovative employment concepts and platforms*
*Challenge every assumption that results in shore basing of Navy capabilities.*
*From Chief of Naval Operations Seapower 21* [1]

1. Admiral Vern Clark, "*Sea Power 21Projecting Decisive Joint Capabilities,*" Naval Institute *Proceedings*, October 2002.


*CAPT Woods and LT Holmes*


# AFSOC



Dan Wyman, MD
Col, USAF
Command Surgeon

AFSOC medics witnessed the start of 2005 from locations across the globe by providing deployed medical care in support of numerous missions in just about every geographic combatant command. In PACOM they provided humanitarian aid in Thailand and Malaysia. In CENTOM they supported direct actions, and conducted CSAR and CASEVAC operations in Afghanistan and Iraq. I read every medical SITREP and MEDRED-C; they offer testimony to the incredible medical capability you bring to the fight. Your dedication and sacrifice are truly awesome – thank you!

It was my pleasure to meet and talk with so many AFSOC medics during this past SOMA…actually that would be SOMA, AFSOC/SG breakout, PJ MOAB, and BISC all crammed into 6 days. The briefings from each of our units during the AFSOC session were fantastic, providing a great exchange of information. While I was unable to attend the entire PJ MOAB, I understand the participants accomplished significant work to include an extensive review and update of the PJ Handbook.

A few issues I plan to move onto the front burner for 2005 are CBRNE medical ops, protection against directed energy weapons, and fatigue countermeasures.

Diagnosing, treating, and transporting contaminated (chem/bio) casualties are capabilities we must be prepared to execute efficiently and effectively. Medics in a variety of our units are trying to develop these capabilities. While I commend this initiative, we must do this as a command effort so that we remain interoperable across the spectrum of medical care platforms. Of these three capabilities, I believe we already possess a strong foundation to diagnose and treat contaminated patients and significant research effort is being expended to improve these capabilities. We must continue to insert ourselves into these efforts to ensure the final solutions (protocols, equipment, supplies, etc.) are compatible with AFSOC medical operations (simple to execute, stand alone, lightweight, portable, robust, etc.). But I believe the largest deficit is in the area of casualty transportation (i.e., CASEVAC). We must develop a system that provides our deployed medics with the capability to transport contaminated casualties, isolating our patients from other operators, aircrew, and medics while still allowing the medic to monitor patient status and administer life-saving care when required.

Directed energy weapons (particularly lasers) are proliferating, by the U.S., our allies, our enemies…and even by civilians. Perhaps some of you read the news earlier this year about the New Jersey man who aimed a laser at a chartered jet and a Port Authority helicopter near Teterboro Airport in late December. I believe that in the very near future Laser Eye Protection (LEP) will be a necessity for our operators to safely execute missions on the battlefield. AFSOC/SG is actively engaged in developing a variety of LEP options that will protect our operators while not degrading mission capability.

Finally, I believe that our command needs a comprehensive Fatigue Countermeasures Program. AFSOC operations frequently entail prolonged wakefulness and/or circadian rhythm disruptions for aircrew,

battlefield Airmen, and medics. While I have no doubt that individual personnel and units use various methods to minimize the effects of fatigue-producing activities, I believe we must develop a thorough system to identify potentially fatigue-producing activities/operations and then to effectively counter fatigue. This program must include education, administrative controls (modified sleep/rest cycles, mission planning, etc.), and pharmacologic agents (as required).

The year 2005 begins with "ops normal" for AFSOC medics. I look forward to a busy year full of challenges and accomplishments. There will probably be some setbacks but also some significant advances, and lots of awesome medics providing life-saving care throughout the world. AFSOC Medical Operations – Anytime, Anywhere. Take care and God Bless!

# DEPARTMENTS

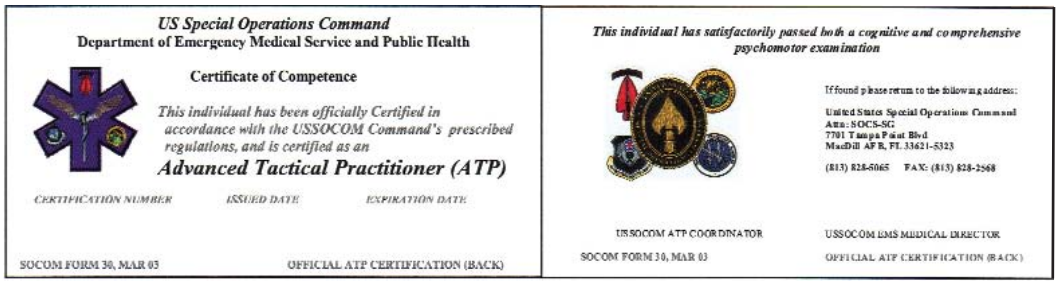
## Education & Training

Steve Briggs, PA-C
Bob McCumsey, EMT-P, IDMT

So, another year has come and gone! As I receive the daily casualty list from the theaters, my heart, thoughts, and prayers go out to those who were injured or gave the ultimate sacrifice. I would like to take a moment to say a prayer for those service members and their families and to focus on why we all are here.

We are working hard on several training initiatives:

1. Captain Butler's main effort is the Tactical Combat Casualty Care (TCCC) Transition Initiative. This BISC-funded project actively ensures all SOF deploying units have the latest equipment, know how to use it, and are fully proficient in TCCC before departing.
2. The Curriculum Examination Board (CEB) is assembling an EMT-P (SOF) certification examination.
3. With the help of the CEB and the component surgeons' offices, our office has developed over 40 Tactical Medical emergency protocols for the SOCM.
4. Another portal for information is the USSOCOM medical web page. We hope to put important, pertinent educational information on it so we can get the information out to the field.
5. Part of our responsibility is to listen to our readers and to the medics. Many have expressed their opinion on the USSOCOM credentialing card. Specifically, "for what purpose are we putting individual pictures on the USSOCOM cards?" Below is a copy of the new proposed card. Let us know what you think!
6. As you can see, we propose to change the name of the SOCM to the Advanced Tactical Practitioner (ATP). Many senior enlisted personnel endorse the change. Initial feedback appears positive!




Front Back

Shifting gears... I'd like to talk about the *Journal of Special Operations Medicine* (JSOM).

The JSOM, as stated on the front of the cover, is a "Peer Reviewed Journal for SOF Medical Professionals." Its founders conceived it on the principle of communicating and educating our medical operators on relevant items of SOF medical interest. USSOCOM is funding the JSOM based on the continuing education it offers. Many of the articles we receive are excellent and relevant to our medics. They are high quality and well written. However, we are lacking CME article submissions. Our goal is to be able to offer you at least 3 CME credits per edition.

During the Special Operations Medical Association (SOMA) conference in December, I talked to many of the enlisted medics about their perception of the conference. Again, this year as with many previous years, the overwhelmingly comment was that SOMA's educational intent missed its marked audience: the enlisted SOF medic. They want more topics that cover what the SOF medics are seeing.

We may not have control over the SOMA presentations but we do have control over the educational material in the JSOM. However, that control is limited by what you submit. We can only put out what you put in. Some of you complained that the articles aren't relevent to you; then we ask that you share your knowledge and experiences with your buddies. Not only do we continue to want scientific medical article submissions, but we very much want your "Lessons Learned" and "Expedient Medic" articles. We are also looking for "There I Was" and "Legacy" stories. Remember, it's *your* journal and *you* have a lot to say; say it in the JSOM. Again, keeping in mind that we can only put out to you what we receive in from you! SHARE!

So, what's the benefit? Well, the benefit is mentorship; sharing your knowledge, expertise, and experience with your peers. Educate another medic to potentially save a life, perhaps even yours. The bottom line is that traditionally in SOF we preach that we mentor our new colleagues. This is a professional thing in which we all need to participate. We all understand the constraints of time and the operational tempo; however, please take a little time to send us a photo and some of the "particulars." We will be glad to work with you to develop your ideas into a compelling article.

In our attempt to make a good product better, we continue to solicit your help! We want to see the JSOM serve as a valuable tool for educating our medical personnel, wherever in the world they may be. In order to do this, we are attempting to increase our distribution to reach deployed units in the different theaters. This continues to be a challenge. If you have good addresses or points of contact that can assure widest dissemination to our deployed guys, please send them to Major DuGuay.

What type of articles do we want? From my training perspective I want to cover three areas:

1. **Clinical and Tactical Updates.** These articles should focus on the latest information about common conditions that our medical providers encounter in their AOs. Please see the "Submission Criteria" in the back of the JSOM for style. Three objectives and a ten question test should be included for continued education credits. Select topics with the SOF medic and his capabilities in mind. We encourage specialists to review topics from primary and emergency care perspectives. The articles should include tables, charts, and photos we can reproduce plus references and a recommended reading list. In addition, we request the author's headshot and a curriculum vitae, to include all current titles and affiliations.

2. **Medical Challenge.** These articles should provide a step-by-step account of a case encountered in a SOF or clinical environment that other SOF providers may encounter, and cases that were particularly challenging to diagnose and/or treat. These "Case Report" articles should have two parts: the case report and the analysis. The case report reviews patient presentations, history, and the diagnostic twists and turns that eventually led to the diagnosis; the analysis describes the lessons learned. Also under this heading is the "Lessons Learned" topic we mentioned above. Here we are looking for your experiences, both good and bad, that can help guide the way for someone that follows. Why reinvent the wheel each time? We highly encourage submission of digital photos or slides since a picture is worth a thousand words.

3. **Picture Puzzler.** Each of these articles should open with one to three color photos (e.g., derm, ECG, radiograph, etc.) and a 50 to 100 word report describing the patient and/or presentation, without giving away the diagnosis. This is followed by a 500 to 1000 word description of the problem, how the diagnosis occurred, a review of the condition, a differential diagnosis, and an explanation of the patient's treatment and outcome. Contact the JSOM editor, Major DuGuay, to approve these topics prior to submission.

In addition, if you know of a fast and expedient tip let us know and we will post it in a "tip box."

Again, the JSOM is only as good as the information that people provide. We appreciate your assistance in making the JSOM a quality journal that all our providers look forward to reading.


Mr. Bob Clayton, SVERDRUP

**USSOCOM Biomedical Initiatives Steering Committee (BISC)**

The Biomedical Initiatives Steering Committee (BISC) conducted the second quarter meeting in Tampa, FL on 16 December 2004. As I have previously mentioned, the BISC is comprised of the Component Surgeons or their designated representatives and they provide the input for the USSOCOM Medical Technology (MEDTECH) program. This program is managed under the Director, Special Operations Acquisition and Logistics-Technology (SOAL-T). All BISC approved biomedical research and development efforts are funded and managed by the Program Manager (PM) MEDTECH. The BISC members meet to focus on medical issues that impact on the mission, training, and performance of SOF. Primary research areas are: Diving Related Studies, Performance Enhancements, Combat Casualty Care, Medical Informatics, and Graduate Research Studies. The BISC is regulated by USSOCOM Directive 40-1, which is currently undergoing revisions to incorporate recent Department of Defense guidance on the use of human subjects in research protocols. USSOCOM does not conduct medical R&D, but sponsors various projects with Major Force Program-11 funds. Most of this information is probably not important to the average journal subscriber, but there are two points I am trying to make: (1) there are a lot of people in the background that are making things happen, and (2) there is lot of activity involved in the R&D process that causes the process to be somewhat lengthy and cumbersome. The second one may seem cumbersome but necessary to protect individuals and to provide controls on medical research in SOF.

The BISC members have approved the following projects for funding in FY05:

**PROTOCOLS AND TECHNIQUES FOR NEW EQUIPMENT AND TECHNOLOGIES WITHIN SOF**

Compare available methods of interactive educational technology that allow medical operators to train on new medical equipment and technologies through employment of computer-based training programs. Deliverable is a high-quality, digital training program formatted on CD not requiring installation of a program on the computer and compatible with currently authorized software and hardware within SOF. The training program must incorporate application procedures, use protocols, and techniques for new medical equipment and technology insertions in the SOF inventory.

**PREVENTION OF MOTION SICKNESS IN SOF OPERATIONS**

Conduct a laboratory comparison of phenergan/caffeine, meclizine, and transdermal scopolamine for prevention of seasickness. Deliverables are research report suitable for publication in the peer-reviewed literature and recommendations for the best regimens for both prophylaxis of seasickness and treatment of symptoms after onset and recommendations concerning appropriate field trials if required.

**SOF MEDICAL TRAINING PRESENTATIONS**

Add presentations on heat injuries, Tactical Combat Casualty Care (TCCC) for SOF, and any other BISC-recommended presentations to the SOF Mission Performance Enhancement Training CD. Deliverable is the production and distribution of the updated CDs.

**CAUSES OF DEATH IN COMBAT CASUALTIES IN OIF AND OEF**

Review all casualties sustained in OEF/OIF, determine cause of death for all fatalities, and discuss what TCCC measures might have prevented the fatalities. Deliverable is a research report addressing the above issues.

**EFFICACY OF OXYGEN ADMINISTRATION IN THE CASEVAC PHASE OF TCCC**

Compare data from combat casualties with available data from patients with comparable injuries to determine the efficacy of oxygen therapy during the CASEVAC phase of TCCC. Deliverables are a research report suitable for publication and specific recommendations to substantiate a change in SOF medical protocols.

**VISUAL ABERRATION IN POST-CORNEAL REFRACTIVE SURGERY PATIENTS USING PANORAMIC NIGHT VISION GOGGLES**

Review literature regarding visual changes following corneal refractive surgery and the interaction with night vision goggles. Perform a study in pre- and post-corneal refractive surgery patients that will address changes in visual acuity, contrast sensitivity, and visual aberrations (glare, halos, haze, etc.), if any, that occur in post-corneal refractive surgery patients (both Lasik and PRK) using standard 4949G NVGs vs. panoramic night vision goggles (PNVGs). Deliverables are a research report suitable for publication and specific recommendations for changes in SOF medical protocols if appropriate.

**EVALUATION OF SURFACTANT IN THE TREATMENT OF EUSTACHIAN TUBE DYSFUNCTION AND MIDDLE EAR BAROTRAUMA**

Perform a comparative investigation to evaluate effectiveness of intranasal administration of surfactant on increasing eustachian tube compliance as demonstrated by decreasing the effort involved in equalizing middle ear air pressure. Deliverables are a research report suitable for publication and specific recommendations on the use of this mediciation in SOF.

**TOXICITY OF AEROSOLIZED NITROAROMATIC AND CYCLONITRAMINE COMPOUNDS RELEASED DURING SOF BREACHING EVOLUTIONS**

Perform an investigation to evaluate potential health risks due to breaching charges. Analysis of aerosolized components of breaching charges as well as target material will specifically address concerns related to contact and inhalation injury.

**SOF COMPUTER-ASSISTED MEDICAL REFERENCE SYSTEM 2004**

SOCAMRS is a CD-ROM based medical reference system developed to allow SEAL corpsmen and Special Forces medical personnel deployed in remote environments to have access to the wide variety of medical information necessary to support special operations missions. Deliverable was the production of approximately 3,300 CDs that were mailed out in February.

**COMPARISON OF WAVEFRONT GUIDED PRK AND LASIK**

This study is designed to prospectively evaluate wavefront-guided (WFG) PRK. Deliverables are research reports suitable for publication in the peer-reviewed literature.

**EFFECTS OF LOW GRADE HYPOXIA AT NIGHT IN SOF AIRCRAFT OPS**

Determine the effects of long duration flight on cognitive function and night vision using NVGs at 10,000 feet and below. Deliverable is a publication-quality research report detailing the research done and the final results of the effort. The report should also contain recommendations based on the results of the study.

**MEDICAL SUPPORT OF HIGH SPEED BOAT (HSB) SHOCK MITIGATION**

Develop a set of tools to assess and monitor the health and environmental exposure to impact shock of SOF personnel, and to field test these tools. Deliverable is a research report suitable for publication in the peer-reviewed literature.

**COMPUTER-ASSISTED THERMAL PROTECTION PLANNING IN SOF**

Construct and field-test a computer-based model for thermal protection garment selection in SOF maritime operations. Deliverables are the software as described above and three research reports suitable for publication in the peer-reviewed literature detailing software development, laboratory testing, and field-testing.

**DEVELOPMENT OF ALGORITHMS FOR REMOTE TRIAGE**

Determine the most reliable method of ascertaining casualty status in the prehospital environment with a special emphasis on predicting the onset of hypovolemic shock. Deliverables are a research report suitable for publication and changing current protocols in SOF medical training, as well as a PowerPoint presentation suitable for briefing SOF medical personnel and commanders on the results of this project.

**COLD STERILIZATION**

Propose development of a reusable cold sterilization package for use in an austere environment that includes the cold sterilization agent, protective storage case, sterilization container or pouch, and laminated instruction card for field use. Deliverables are a comparative study of cold sterilization agents and a cold sterilization field pack consisting of the items listed above.

**SOF PERFORMANCE ENHANCING DRUG PROTOCOLS**

Evaluate the effects of several fatigue countermeasures on crew behavior under laboratory conditions. This assessment includes comparisons during sustained operations of modafenil (three 100 mg doses), dextroamphetamine (three 5 mg doses), and caffeine (three 200 mg doses) to a placebo. Deliverables are a research report and drug protocol suitable for publication in the peer-reviewed literature, specific recommendations, and narrated PowerPoint presentation(s) suitable for training SOF units.

**TCCC TECHNOLOGY TRANSITION INITIATIVE**

Conduct combat evaluation trials of new TCCC equipment being fielded by deploying SOF units and gather user feedback when the units return. Deliverable is a research report stating specific results and recommendations suitable for publication in the peer-reviewed literature.

One of the comments during the last BISC meeting regarded the SOF Medical Handbook. A planning cell is being formed to lay the framework for the second edition. FY06 funding should be available for this effort. The Component Surgeons have been asked to consolidate any recommended changes or revisions and to support this effort with a dedicated team of Subject Matter Experts that will become members of the Integrated Process Team (IPT). Once all of the timelines and milestone schedules have been established, I will provide more details. Until then, if you have ideas on how to improve the handbook, contact your Component Surgeon's office.

The BISC is in the process of planning for the FY06 program. Projects are initiated based upon the needs of the Components. These needs are expressed in a Task Statement, which is usually a two page description of the need. Over the past two years the BISC has tried to focus on emerging issues in support of ongoing operations. It is important for you to pass on those lessons learned or observations in order to find solutions to fix what may be broken or improve upon what you already have.

As a reminder the following are your BISC members:

USSOCOM, CAPT Frank Butler, Chairman
USASOC, COL Warner (Rocky) Farr (voting member)
USASOC, Mr. Joe Marak
NAVSPECWARCOM, CAPT Edward Woods (voting member)
NAVSPECWARCOM, HMCM Mike Beske
USAFSOC, Col Daniel Wyman (voting member)
USAFSOC, Col Robert Michaelson
JSOC, COL T. Deal (voting member)
JSOC, LTC Robert Lutz
JSOMTC, COL Kevin Keenan (advisor)
MEDTECH Program Manager, Mr. David Saren


LT Shawn Wood, Medical Plans, Operation & Logistics
CPT Steven Briggs, PA-C, Education & Training

The USSOCOM Surgeon's office experienced several personnel changes in the fourth quarter of 2004. LTC Will Schiek departed on 29 Nov 04 for Fort Hood to take command of 4th ID Support Battalion. COL Heintz, the Deputy Surgeon, retired on 17 Dec 04. We wish them well. Welcome aboard to MAJ Chris Coley (Plans, Operations & Med Intel), Maj Tim Dykens (Resources and Plans), and LT Shawn Wood (Plans, Operations & Med Intel/Logistics). Lt Col Jim Lorraine serves as the Acting Deputy Surgeon until his retirement in May 2005.

The OPTEMPO of our Special Operations Forces remains high. With deployments all over the world and in austere environments, the need for flexible and responsive Level I and II capabilities becomes ever more important. The following article provided by CPT Roy Vernon (Med Ops Officer, HQ, SOSCOM (A), SOSCOM Surgeon Office) is important to all SOF medics and medical planners involved with medical support.

**Army, Air Force Special Ops medics test joint capabilities at Fort Bragg**

By Joanna Hawkins
U.S. Army Special Operations Command

FORT BRAGG, N.C. (USASOC News Service, 22 Dec 2004) - A first-of-its-kind joint Special Operations Forces medical training initiative occurred here from 6 through 10 December 2004 in conjunction with a Company C, 528th Special Operations Support Battalion (Airborne) training exercise.

Medical elements from the Air Force Special Operations Command joined Soldiers from the 528th during the weeklong exercise. It combined Army Level I and II combat casualty care treatment capabilities with the addition of Air Force surgical and en-route intensive care.

The concept of an advanced joint medical capability categorized as Level II already existed "unofficially" within the U.S. Special Operations Command, according to MAJ Lory Kay Wheeler, Special Operations Support Command (Airborne) surgeon.

Level I medical facilities operated by the 528th serve as treatment areas that handle emergency medical treatment and advanced trauma life support. In addition Level I also provides a sick call and preventive medicine capability to units operating in the supported AOR. Nine medical personnel, including a physician's assistant, seven medics, and a preventive medicine specialist, make up a Level I team.

The addition of Level II facilities will provide Special Operations Command with a more robust initial entry patient care facility. The Level II team can support any Level I capable unit and will provide four intensive care (ventilator capable) patient beds and six additional beds for regular patient holding. In addition the Level II team provides laboratory services, digital x-ray, ultrasound, and dental capabilities to the supported SOF force. Ten medical personnel, including a critical care nurse, two licensed practical nurses, one Special Operations Combat Medic, one x-ray technician, one laboratory technician, one patient administration specialist, one medical logistics NCO, and a biomedical equipment repair specialist, make up the Level II team. In the near future, with additions planned in a new personnel-manning document, the 528th will have the capability to field two separate Level II teams.

"During the planning and development of the Level II team we wanted to ensure the team was fully modular to provide the right medical care at the right time," said MAJ Wheeler. The team can be task organized to meet any mission requirements and can be augmented with a veterinarian, veterinarian technician, and an environmental science officer based on the mission.

Combining all components of a Level I facility plus resuscitative surgical capabilities make up a joint SOF Level II medical facility.

During a recent deployment to Iraq, the 528th combined its treatment and patient holding capabilities and the dental capabilities of the U.S. Army Special Forces Command (Airborne) with the surgical and critical care evacuation capabilities of AFSOC to provide better medical care for Soldiers. According to Wheeler, this joint endeavor proved highly effective.

In May 2004, MAJ Wheeler began working with AFSOC on a proposal that would go to the USSOCOM surgeon, suggesting that this medical capability be handled jointly. "This way, SOF would have a joint Level II medical facility with resuscitative surgical capabilities," she said. MAJ Wheeler, together with AFSOC, outlined several plans to validate this concept, which included the joint SOF Level II medical training exercise.

"This is round one, making sure the puzzle pieces fit," said Air Force Lt Col Mark Ervin, chief of the Special Operations Surgical Team, or SOST. Ervin added that the joint medical training is the first of a series of training events intended to aggressively test and validate proven concepts.

Air Force SOSTs are highly mobile and able to travel lightly. Composed of a general surgeon, orthopedic surgeon, anesthesiologist, surgical tech, and an emergency room physician, SOSTs perform a small number of "damage control" surgeries, including amputations and orthopedic surgery.

During the training here, all four of these elements came together and participated in a mass casualty exercise, simulating real-life surgical procedures validating the need of the SOF Level II team.

Additionally, SOF Level II facilities include Air Force Special Operations Critical Care and Evacuation Teams, or SOCCET. This three-person team, including a respiratory therapist, critical care nurse, and critical care physician, evacuate post-surgery patients to higher levels of care. An added benefit of the SOCCET team is the capability, prior to their evacuation mission, to use the team during a mass casualty situation.

SSG Raul Diaz, the 528th critical care noncommissioned officer-in-charge, played a key role in planning the joint medical training. Diaz said the exercise was an opportunity for Level II-plus medical facilities to get exposure so more of its kind will come into existence throughout the SOF community.

**USSOCOM Note:**

From 23-25 July 2003, the USSOCOM Surgeon's office conducted an OEF/OIF medical after-action review. One of the top eight requirements recognized at the AAR conference was the need for Level II surgical/resuscitation capability in the SOF AO. This is not a new concept since SOF always had the need for Level II care. Usually SOF depends on the conventional force's medical assets. Historically, the problem was getting those assets to co-locate with SOF elements, who typically operate forward of the forward line of troops and forward edge of the battlefield (FLOT/FEBA), far from Level II combat health support facilities. Historically speaking conventional forces will not advance beyond their logistical capability behind the FLOT/FEBA. Hence we never have had this level II capability. However, over the past decade most operations, such as those in Somalia, Bosnia, Kosovo, Afghanistan, Djibouti, and Iraq, occurred on a nonlinear battlefield. These situations opened the way for extending Level II capabilities closer to SOF forces than in the past. During the AAR conference SOF leaders decided that with some modifications the 528th (MAJ Wheeler) would best be able to pioneer this effort.

In December, I observed first-hand their newly formed Level II operations. MAJ Wheeler assembled a remarkable team. Although they performed no major resuscitative surgery, they established that capability. During my visit the team performed some minor surgery. That day it seemed like they had a dermatology and sterilization special. Although a few ancillary positions were vacant and some puzzle pieces needed improvement, overall they were off and running. The next steps will be to fully fill the positions and then to exercise the Level II team in a joint, combined, or coalition exercise. Stay tuned for updates!

# The Military to Military Connection: Combating HIV/AIDS among African Militaries

## Part II: Bridging the Training Gap with Special Operations Forces

Kevin F. Riley, MSC, PhD


### ABSTRACT

The impact on regional security and stability is affected by many factors, and HIV/AIDS is one of the major contributing factors in destabilization. There is also strong evidence that war itself is a factor in the rapid spread of the virus in Africa. Conflict brings economic and social dislocation, including the forced movement of refugees and internally displaced people, with the resulting loss of livelihoods, separation of families, collapse of health and education services, and dramatically increased instances of rape and prostitution. All this contributes to conditions for the rapid spread of HIV and other infectious diseases. The recognition of uniformed services as a high-risk population, and the development of active programs to reduce HIV/AIDS transmissions among military populations can significantly improve regional development by reducing the destabilizing effects of this epidemic. Improved and aggressive integration between the United Nations, the United States, and the Department of Defense is needed to affect specific strategic outcomes and regional security goals through sustained programs.

The integration of Special Operations into military-to-military HIV/AIDS training programs is a credible and effective means to achieve advances toward reducing transmissions, and to assist the promotion of a healthier population to support regional development and security.




*"When a road is good, it is used a second time."*
*African Proverb*

A long-established ethos exists in most uniformed services of loyalty to comrades and of officers looking out for the well-being of those under their command. This supports unit cohesion, which is paramount in the uniformed services. Military leaders are also increasingly aware that meeting the challenge of HIV/AIDS is every bit as important as colloquial battlefield operations, and that prevention is cheaper than providing healthcare services to those who become infected.[1] Direct military participation, especially by Special Operation assets, in African military training and awareness programs can be an effective and credible means to effect change and provide positive U.S. presence in deterring regional instability.

Special operations forces inherently have very effective and proven methods to provide worldwide

deployable personnel and competent training for target countries. With their experience in both conventional and unconventional military operations such as humanitarian and civic assistance, deployments for training, subject matter expert exchanges, and military training teams, they are the ideal assets to integrate into programs like DoD HIV/AIDS Prevention Program (DHAPP).

Using special operations training teams or integrating SOF personnel with conventional forces who conduct these types of missions gives unified commanders greater flexibility and increased opportunities in their respective theaters. Training missions not only provide obvious support to theater commanders and country teams, but can also increase special operations regional presences and experiences. In addition, operations, training, security cooperation, or military-to-military deployments have the return benefit of improving the deployment skills and readiness of all of our active, reserve and guard forces.

**PEER EDUCATION**

An effective military-to-military program should be based on a standardized training plan with easily reproducible products and handouts. DHAPP has examples of several effective training models they have developed and tested through a variety of training teams and missions throughout Africa. Another example of a ready and reproducible training model is the *United Nations Peer Education Kit for Uniformed Services,* produced as part of the *UNAIDS 2003 Series: Engaging Uniformed Services in the Fight against HIV/AIDS.* The UN developed these training materials based on a critical need to find effective ways to lower the risk-taking behavior that leads to infection with HIV and other sexually transmitted infections (STIs) in uniformed services populations (i.e., military, peacekeepers, police).

Behavioral change, based on acquiring knowledge and learning skills, along with individual risk assessment, is an effective method for reducing risk-taking behavior and encouraging uniformed services personnel to become advocates in the fight against HIV, AIDS, and STIs. Peer education is an important component in achieving behavior change. When addressing HIV, AIDS, and STIs among uniformed services, this peer education kit can be used both in the training of peer educators and by the peer educators themselves. The kit contains exercises designed to desensitize sexual issues, assess risk, and enhance communication within relationships. Exercises on condom use and STIs are also included.[2]

Regardless of the training model selected, military-to-military participation realistically cannot be expected to execute extended missions in HIV/AIDS training. However, by targeting specific populations and locations and by using peer educators, cost effective and country- sustainable programs can be achieved.

**TARGET POPULATIONS**

Specific attention and program design should provide training and develop awareness programs that focus on young recruits. Young people are at the center of the HIV/AIDS epidemic, with half of all new HIV/AIDS infections occurring in persons between the ages of 15 and 24, the most sexually active age group.[3]

Their behavior, the extent to which their rights are protected, and the services and information they receive, determine the quality of life for millions of people. This is the case among youth in general and young recruits in particular, who face new and challenging environments where they are often detached from their accustomed community and family environment, are increasingly mobile, and are the most influenced by their professional ethos and training. In the same way, young people offer the greatest hope and opportunity to change the course of the epidemic. Among uniformed services, youths and young recruits have a strong influence on their peers, within and outside the service. They are also the future officers, leaders, and decision-makers in their country.

Defining the target is just as important as defining the training method While programs like DHAPP are inherently designed for military populations, the best impacts within that population should be defined. Military-to-military training is best used when targeting very specific populations in common centralized areas such as indoctrination centers, basic training, and, very importantly, demobilization centers. Leaders should give attention to any equivalent NCO and officer academies to promote leadership responsibility and force protection standards of appropriate prevention and control practices.

Training camps and indoctrination centers serve as good targets for high HIV education impact. These environments allow training teams to get the most personnel trained and more importantly give the opportunity for the host country to develop and sus-

tain its own training and awareness program. Leaders can develop specific training plans, promotional items, and posters that will provide continuous reminders and promote behavior changes that could have lasting results.

### Partners in Demobilization

Next to the specific training of young recruits in initial military training environments, significant military-to-military emphasis should be placed on the active participation in the training and education of demobilizing troops.

The disarmament, demobilization and reinsertion (DDR) into civil society of troops who are no longer considered essential to national security has followed many conflicts throughout history. Contemporary Sub-Saharan Africa is no exception to this pattern. While some countries engaged in demobilization of their own volition, others received encouragement and support in DDR efforts from international agencies as part of post-conflict reconstruction agreements, peace agreements, and attempts to re-vitalize national economic and social development. The primary motivation for international donor support of DDR exercises is preservation or reconstruction of local security, although other reasons exist. Local security logically contributes to regional security, which in turn contributes to a more stable global environment, and thus benefits donors.[3]

Integrating military-to-military HIV/AIDS training into DDR programs is an excellent way to address health development issues that are rarely addressed in DDR programs either as a goal or as an indirect result. Because HIV/AIDS is a direct threat to security and stability in Sub Saharan Africa, including HIV/AIDS prevention in DDR programs will improve security-promoting efforts by reducing the potentially adverse impact on the health of the larger community that demobilization of combatants with health problems and their reintroduction into the community can have.

### Advanced Training Opportunities

Military-to-military training of African uniformed service medical professionals to diagnose and treat common STIs can also be an important first step. Syndromic case management, where physicians treat all-important causes of the syndrome, is effective in the prevention and treatment of STIs, and requires no expensive laboratory procedures. Medical professionals can achieve it by using a combination of responses, the essential components of which include:

- Classification of the main causative agents by the clinical syndromes they produce;
- Treatment for all important causes of the syndrome;
- Promoting the treatment of sexual partners.

For example, in syndromic case management, a man complaining of urethral discharge would be treated for both gonorrhea and chlamydial infection, while a person with a genital ulcer would most likely be treated for chancroid and syphilis. The syndromic approach offers accessibility and immediate treatment. A disadvantage is over-treatment in some patients. Studies show that syndromic case management of STIs is more cost effective than diagnosis based on either clinical examination or laboratory tests.[1]

Self-treatment of STIs is a common problem among uniformed services personnel who may be too embarrassed to seek reliable treatment, have no appropriate services available, or are concerned that having an STI on their service medical record will be a disadvantage to them. Leaders can develop strategies to collaborate with pharmacies near uniformed services facilities to encourage referrals to public STI services. Establishing and promoting of anonymous services within the uniformed services facility also increases their use.

To decrease the likelihood of repeated infection, condom promotion and prevention counseling should be part of the treatment. STI services that effectively and systematically conduct contact tracing also reduce the chances of repeated infections. For example, working with local health officials to organize STI prevention activities with sex workers located near uniformed services facilities can reduce the STI rates of uniformed services personnel, the sex workers, and local national patrons.

### Summary

It is imperative that military personnel learn effective HIV/AIDS/STI prevention strategies so they can protect their health and the health of civilian populations in the areas where they operate, and to maintain the integrity of their missions. An impact on HIV/AIDS reduction is not easily measured or supported, especially in heavily affected areas such as Africa. However, HIV/AIDS training and awareness, when presented realistically and ultimately sustained, can promote healthier populations within the military, increase the individual's human capital (knowledge and skills), improve the soldier (or ex-combatant) as a

resource for development, and assist in reducing social problems. The military-to-military connection, with well developed and country sustainable HIV/AIDS training programs, together with the deployment of credible personnel such as special operations forces with their well-developed and sustainable programs, can achieve advances toward reducing transmissions and assist in promoting a healthier population to support regional development and security.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# Bad Decisions, Poor Outcomes: A Model to Explain Why Some Threatening Events Become Worse

Gordon G. Giesbrecht, PhD

## ABSTRACT

When faced with threatening events, humans sometimes make inappropriate decisions that aggravate their situations, resulting in injury or even death. A schematic model has been developed to illustrate how increased stress and lack of training compromise the quality of decision-making. The model shows that as conditions become more stressful, inherent ability to make quality decisions decreases. Education, training, and practice can improve decision quality. Training can target three areas: generally increasing knowledge and technical abilities; being realistic in the face of a threat while not overestimating the severity of the situation; and minimizing panic. We present case studies to illustrate the model.



## INTRODUCTION

Humans may experience a stressful event that either poses, or seems to pose, a significant threat to personal safety and survival. Poor decisions often aggravate the situation, resulting in worse injury than would be expected, or even death. This phenomenon applies not only to primary victims but also to emergency personnel who inadvertently become secondary victims. This can present a problem for military, rescue, and emergency medical responders, who may exacerbate the seriousness of an incident by rushed, and often unintentionally harmful, decisions and actions.

The author developed a schematic model to illustrate how quality of decision-making becomes compromised under stress, causing errors. The model shows that as conditions become more stressful, a person's inherent ability to make good decisions decreases because decisions are made more quickly. Education, training, and practice decrease risk by improving decision quality.

The model indicates that higher stress conditions provide less time for reasoned thought and result in a tendency for instinctive, or habitual, behavior. Inadequately trained personnel will tend to make harmful instinctive decisions (errors) due to several factors including: 1) relying on information that is incorrect; 2) rejecting accurate information; 3) misapplying accurate information; and 4) choosing inappropriate actions under stress.

The model relates primarily to threats that allow relatively short decision-making periods ranging from only seconds to minutes. It does not focus on threats requiring decisions within sever-

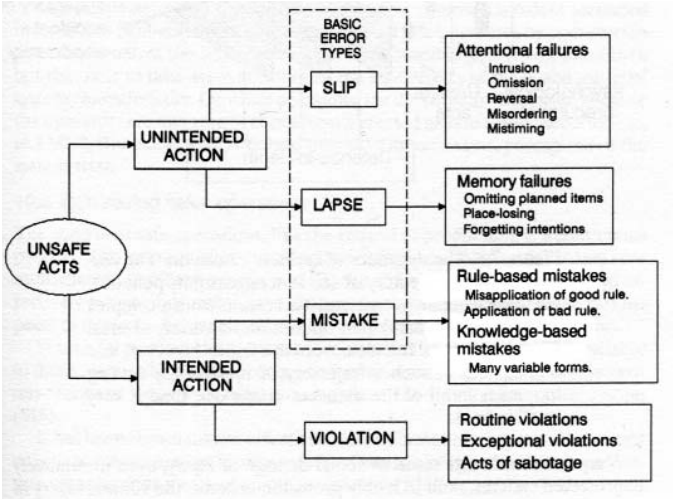


**Figure 1** *A summary of the psychological varieties of unsafe acts caused by errors. Used with permission.*[1]

al minutes to hours. The model emphasizes the importance of training, education, and practice in preventing bad situations from becoming worse, or even fatal. Note that preparation does not guarantee success, as some events present a threat from which survival is impossible.

James Reason developed a general overview of psychological varieties of unsafe acts or errors.[1] Figure 1 describes three basic error types. Unintended actions can result from either a slip (due to attentional failures) or a lapse (due to memory failures). Intended actions (results of decisions themselves) can result in mistakes that are either rule-based (misapplying good information or applying bad information) or knowledge-based. The present visual model attempts to provide a framework consistent with all three basic error types, although it primarily focuses on mistakes resulting from bad decisions.

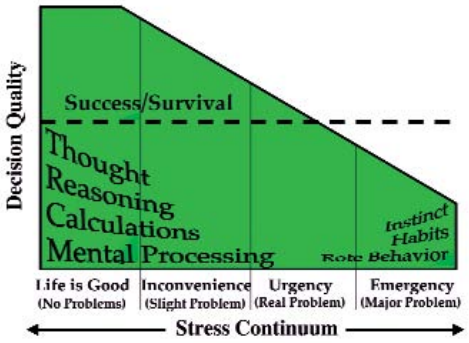


**Figure 2** *The relationship between the level of stress and decision quality. Decision quality (indicated by height) is related to the time available for a decision to be made. The dashed line represents the threshold of decision quality that must be reached (i.e., height) in order to obtain a successful outcome.*

## THE MODEL

### General Stress Continuum

Figures 2-5 illustrate the model. In Figure 2, the x-axis expresses stress as a continuum ranging from little or no stress, to slight stress (inconvenience), to urgency (significant threat with little temporal pressure or chance of fatal outcome), to emergency (extreme threat with real chance of fatal outcome; within a compressed time frame).

The y-axis on Figure 2 indicates the quality of the decision making process; the height of each green column indicates decision quality. The dashed line represents the decision quality threshold that must be reached for success and/or survival. When little stress exists, the quality of decisions is high because time is available for thought, reasoning, mental processing, etc. However, in higher stress urgency and emergency situations, less time is available for high quality decision-making; thus individuals tend to act more on instinct, rote behavior, and habits. Consequently, decision quality may not reach the threshold for success or survival under higher levels of stress.

### Case Study 1 - Instinctive behavior

This common-pattern news story occurred when a man was walking his dog along North Saskatchewan River.[2] The dog fell into the water while chasing some ducks or geese. Rather than seek some safe means with which to extricate the dog from the icy water, the dog owner rushed into the water to save the dog and he drowned. The news article pointed out that if dogs get into trouble, their owners have to make quick, tough decisions. Relatives were quoted as saying "It's instinct. If you see someone you love, you're going to go in and try to save them." Even though it is generally understood that going into icy water could be dangerous, relatives indicated that instinct would takeover under stress; "I know better too and I'd still go in the water; you just don't think about it."

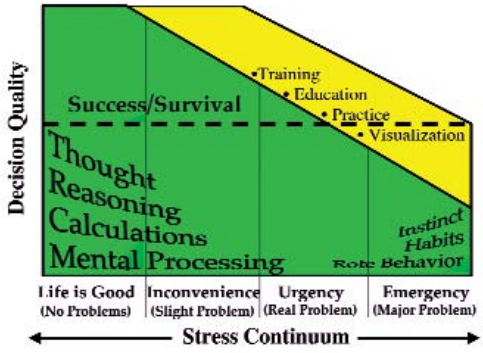


**Figure 3** *Training, education, practice, and visualization will help increase the decision quality (height) at all levels of stress. This preparation may allow success even in an emergency.*

### Positive Effect of Training

As indicated by Figure 2, highly urgent or emergency situations may not allow for decisions of high enough quality to reach the success-survival threshold. Figure 3 illustrates how the quality of decisions can be improved (indicated by height). The yellow area illustrates how training, education, practice,

visualization, etc., contribute to reaching the success-survival threshold.

### Case Study 2 - Training causes success

In one of the most famous incidents of cold-water near-drowning, a father was pulling his son on a sled along Lake Michigan near Chicago.[3] The boy and his father slipped onto the ice where they broke through into the icy water. The boy immediately slipped beneath the ice but the father was rescued after about 20 minutes of head-out immersion. Rescue divers arrived on scene quickly, donned their SCUBA gear, entered the water, and conducted an effective under-ice search, recovering the boy minutes later. The boy was in cardiac arrest. EMTs transported him to hospital, where he later recovered without sequelae due to excellent medical care. The rescue team indeed had little time to make decisions and carry them out. Prior training in under-ice search and rescue procedures contributed to this successful rescue under challenging and stressful conditions.

Note that training will produce patterned actions and decision-making. Under some specific conditions, automatic triggering of patterned actions may be undesirable (e.g., automatically heading for an emergency exit that, at that particular time, is actually in harm's way).[4] In such a scenario, the most important training outcome would be the ability to quickly gather the facts available (checking the temperature of the emergency exit door before using it in a fire) in order to make an analytical decision before committing to a course of action.

### Panic and Threat Overestimation

Just as education and training can increase the quality of decisions under stressful conditions, several factors can decrease decision quality and the probability of success. Figure 4 first illustrates that panic (in red) tends to increase with the level of stress, and may result in failure to succeed in urgent and emergency situations. Panic is a form of behavior in which judgment and reasoning deteriorate so far as to often result in self-destructive behavior.[5] In emergency situations time is often short and panic causes quick, often irrational, actions that invariably worsen the situation. Second, a lack of preparation can also result in overestimating the level of threat that a given event presents. In this situation an urgent threat may be overestimated and treated as an emergency. Even though more time may actually be available, decisions are made as though an emergency is in progress and time is limited. In either scenario, decision quality will not reach the threshold for success because mental processing was replaced with instinctive behavior.

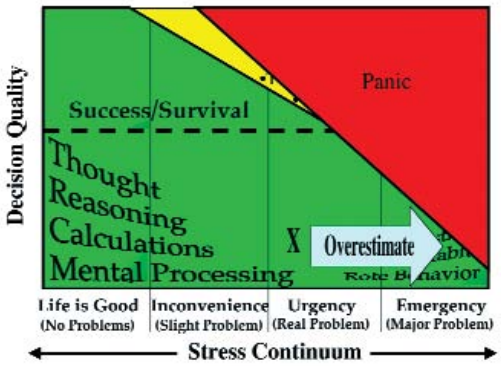


**Figure 4** *The effect of panic is illustrated. The amount of panic tends to increase as the stress level increases. Panic often reverses the positive effect of training and results in failure. The "X" represents an urgent threat that could result in failure to reach the success threshold if the threat is overestimated and decisions are made based on the belief that the situation is an emergency.*

### Case Study 3 - Panic

Three women drowned when their vehicle went off the road, plunging into the Passaic River in New Jersey.[6] The women were trapped in the rapidly sinking SUV but had time to use their cell phone to call for help. However, instead of calling 911, they called a friend on his cell phone. An eyewitness, who tried to break the windows of the vehicle reported that "the victims were conscious and screaming 'Help me, help me!'" In this state of panic the victims were unable to tell their friend where they were, thus causing a delay in arrival of emergency personnel. Since the vehicle sank so quickly, the police stated that they might not have been able to save the victims even if they had known immediately where the accident occurred. However, the actions of the victims were consistent with panic and, at best, did not improve the chances of survival.

### Case Study 4 - Threat overestimation

Two Australian adventurers were trekking to the North Pole when one of them fell through the ice.[7] This was truly a threat but the victim overestimated the urgency of the situation, feeling it was an emergency because "we had four minutes to get me out of the water before hypothermia killed me." Even though hypothermia would not be fatal for at least an hour with full Arctic gear on, the victim experienced "pure terror" because he felt he had much less time to live. In his highly stressed state of mind, he did not

notice that his partner had thrown him a rope, nor could he hear him yelling. With his "frenetic movements" he "kicked wildly, losing a ski in the process." The overestimation of the immediate threat prevented the victim from taking the extra seconds to remove and secure his skis before exiting the water. Losing the ski and binding produced a significant risk since the loss slowed further progress toward their goal and ultimately prevented success.

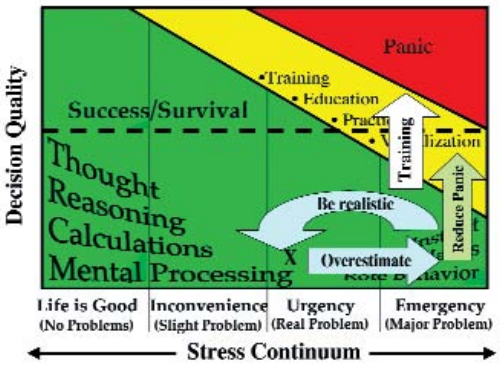


**Figure 5** *The probability of reaching the threshold for success in high stress conditions can be increased by reducing panic, training, and learning to make realistic threat assessments prior to decision-making.*

### Improving Decision Quality

Figure 5 illustrates several ways in which success can be achieved in higher stress situations. As stated earlier, training, education, practice, and visualization can help increase decision quality. Second, proper preparation and mental training can reduce or eliminate panic. Finally, individuals often overestimate the seriousness of their situation. They can prepare themselves to take a moment to realistically judge the threat facing them or someone they may be trying to help. Thus, when they are in an inconvenient or urgent situation, they take time to make appropriate decisions.

### Relevance to Special Operations Forces

Special operations forces are often called upon to rescue and provide medical treatment for themselves or others under threatening high stress conditions. Under these intense conditions it is logical that time should be taken to accurately assess the ongoing threat to security before taking action. Experience reveals that panic, misinformation, overestimation of the threat, and inadequate training and preparation may result in unnecessarily rapid actions. Training scenarios for technical rescue and medical treatment should include realistic simulations of all, or at least most, of the potential threats and distractions that SOF personnel might face in theater.

Reason described several methods of decision making, originally designed for engineering systems, that can be applied in many scenarios.[1] Rouse developed a "fuzzy rule" model that assumes that humans would rather make simple patterned decisions than more complex ones.[8] Various strategies can help people use simple problem-solving rules. Rules are implemented when the predetermined causal situation is present. This system is predicated on rules being recallable, applicable to the situation, effective, and simple. Although the actions may be complex, simpler processes for making the decisions that initiate the actions would increase the possibility of initiating proper action.[1]

Duncan described a similar system of applying short sequences of diagnostic rules.[9] This training addresses, and attempts to correct, the tendency to apply familiar but inappropriate solutions, the tendency to prefer strategies that readily come to mind, and the tendency to accept incomplete or incorrect knowledge.

## CONCLUSION

This model illustrates some reasons why people make poor decisions or errors in threatening situations, thus actually worsening the outcome. While success and survival are not possible in all threatening situations, people can take certain actions to increase their probability of success. Education should focus on correcting misinformation and providing proper technical sequences and principles. Training should target three areas: generally increasing the quality of our decisions and actions; being realistic in the face of adversity and not overestimating the severity of the situation; and minimizing panic. Finally, repeated practice in conditions that are as realistic as possible provides proper patterning for appropriate reactions when time may be short and decisions are made under time pressure.

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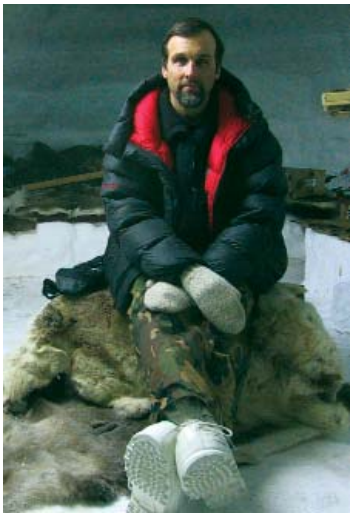


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Gordon serves on the board of directors of the Wilderness Medical Society. Dr. Giesbrecht recently served on an advisory panel that revised the state of Alaska Guidelines for Treatment of Hypothermia and Cold Injuries. Dr. Giesbrecht has been featured on several television documentaries. He also recently appeared on the "Late Show With David Letterman" where he demonstrated self-rescue from ice water, cold immersion physiology, and hypothermia rewarming techniques.

# The Esophageal-Tracheal Combitube: A review of the device and its application in the SOF environment

Bob W. Hesse, RN, NREMT-P, I/C; Troy R. Johnson, MD; Dan S. Mosely, MD; Andre M. Pennardt, MD

## Abstract

Endotracheal intubation has long been recognized as the standard for any patient requiring definitive airway control, regardless of the environment. Unfortunately, intubation sometimes cannot be accomplished despite the careful preparation and clinical expertise of the provider. The esophageal-tracheal Combitube® (ETC) is a blindly placed, supra-glottic airway device that has been used successfully for the past 18 years. A comprehensive search of the English language medical literature was performed to evaluate the esophageal-tracheal combitube for its applicability in the special operations environment. Articles regarding Combitube® use in multiple settings and patient populations were examined and outlined. Airway management using the ETC has been shown to be an easily learned and sustained skill with a high success rate and rare complications. Its small durable packaging and ease of use in suboptimal environments make it a particularly attractive airway adjunct for the special operations community. The special operations medical provider should consider use of the ETC as either a bridging device or as a rescue airway device when other means of definitive airway control have failed.

**OBJECTIVES**:

1. Describe the functional anatomy of the esophageal-tracheal combitube (ETC).
2. Summarize the function of the ETC in the esophagus and trachea.
3. List techniques utilized for confirming successful ventilation of the ETC.
4. Identify the indications and contraindications for the use of the ETC.
5. Summarize key patient populations where use of the ETC may be beneficial.
6. Examine possible advantages for the use of the ETC in the military SOF environment.

**CME/CNE**: This activity has been planned and implemented in accordance with the essential areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through joint sponsorship of USUHS and the Journal of Special Operations Medicine. USUHS is accredited by the ACCME to provide continuing medical education for physicians. USUHS designates completion of this article and test **1.0 CME**. Nurses must complete **(both)** continuing education offerings to recieve **1.6** Countinuing Nursing Education Contact Hours**.** Test questions are on page 64. Please complete the answer sheet on page 67 and mail or fax it to us.

**FINANCIAL DISCLOSURE:** The authors reported that their presentation will include discussion of commercial products and/or services. However, within the last two years, they have had no significant financial relationship with a commercial entity whose products/services are related to the subject matter of the topic they will be addressing or a commercial supporter of this educational activity.

*"The significant problems we face cannot be solved at the same level of thinking we were at when we created them."* Albert Einstein

## Introduction

Endotracheal intubation is the "gold standard" for any patient requiring definitive airway control, regardless of the environment. Unfortunately, the operator sometimes cannot intubate with an endotracheal tube despite careful preparation and clinical expertise. When the operator cannot intubate, a number of devices and techniques may be used to secure the airway and ventilate. The American Society of Anesthesiologists and the National Association of EMS Physicians have published procedural guidelines to use when intubation is not possible and ventilation via a bag-valve mask (BVM) is inadequate.[1,2] The esophageal-tracheal Combitube® (ETC) is one of the devices included in their recommendations as an airway "rescue" device. In this article we will review the history and development of this clinical device and discuss its potential application to the prehospital special operations environment.

### *History & Development*

Several devices target alternative strategies for emergency airway management. One example, the esophageal-obturator airway (EOA), is a blind placement airway device. This device mitigated the need for extensive psychomotor skills training and sustainment. However, the EOA manifested several deficiencies after its introduction into clinical practice; notably, limitations in ventilation and unrecognized tracheal placement.[2-11] Dr. Frass and his colleagues developed the ETC to address problems associated with placement and use of the EOA. The ETC, a double-lumen airway, saw introduction to clinical practice in 1987. The intent of the ETC was a tool to be used when traditional endotracheal intubation is impossible or impractical, whether in hospital or pre-hospital arena.[12,13]

The ETC has since garnered wide support during 18 years of clinical use. The European Resuscitation Council and the American Heart Association recommend use of the ETC for patients in cardiac arrest.[14,15] The American College of Emergency Physicians, the National Association of EMS Physicians and the Eastern Association for the Surgery of Trauma recommend ETC use in the trauma patient as either a primary method of pre-hospital airway management or as a rescue airway for failed intubation.[16]

## Design and Function

### *Description*

The ETC is a disposable, poly-vinyl chloride, double-lumen supraglottic device with two balloons. The double-lumen design of the ETC consists of a pharyngeal lumen and a tracheoesophageal lumen separated by a single wall.[17,18] The pharyngeal lumen is closed at the distal end and contains 8 oval-shaped (7 x 3mm) perforations at the level of the hypopharynx (when the device is positioned correctly). The proximal portion of the pharyngeal lumen consists of a blue-colored tube labeled "1" with a standard 15mm connector at the end. The tracheoesophageal lumen is open at the distal end. The proximal end has a shorter, transparent tube labeled "2" which also has a 15mm connector attached to it. A large pharyngeal balloon is just above the perforations on the pharyngeal lumen, and a tracheoesophageal cuff is at the distal end of the device. There are two black lines 22cm from the distal end, which are placed at incisor level to assure correct placement depth (Figure 1).

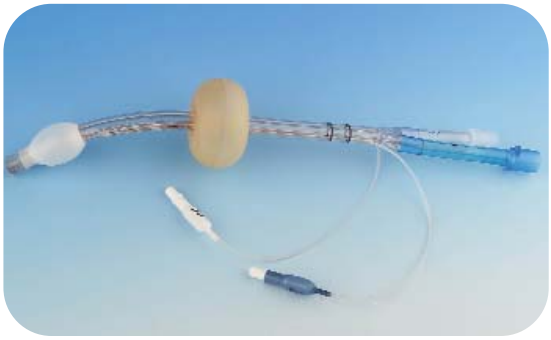

Figure 1

The ETC is available in two sizes, the ETC 41F and the ETC 37F SA (small adult). The manufacturer recommends the 41F for patients over 5 feet tall, or the 37F SA for patients 4 feet to 5½ feet tall. This allows a functional overlap of 6 inches. They are available in a non-sterile hard kit or soft roll-up kit. Each kit contains the ETC, color-coded pre-filled syringes for the cuff and balloon, an emesis deflector, and an appropriate sized catheter to decompress the stomach when the ETC is in the esophageal position.

### *Function*

The ease with which the ETC can be placed is what makes it very desirable for the prehospital environment. The device is designed to be placed blindly, with the head in a neutral position.[12,17,19,20] Unlike endotracheal intubation or use of the LMA, placement of the ETC can occur as long as the

provider has access to the patient's mouth.[12,13,19] This is advantageous when access to the patient's head is limited due to entrapment, or other space constraints.

The two black rings encircling the double-lumen act as markers for correct placement at 22 cm (Figure 1). The patient can be ventilated regardless of whether the ETC is placed into the esophagus or the trachea. One of the lumens functions like an EOA when placed in the esophagus, the other as an ETT when placed into the trachea. Correct placement in the esophagus occurs up to 98% of the time.[12] In the esophageal position, the pharyngeal balloon seals off the nose and mouth by anchoring itself within the posterior pharynx while the tracheoesophageal cuff seals the esophagus (Figure 2). The patient is ventilated via the blue-colored "1" tube. Air is then transmitted to the lungs indirectly through the perforations on the pharyngeal lumen. In the tracheal position, the tracheoesophageal cuff seals the distal end of the ETC in the trachea. The patient is directly ventilated via the shorter, clear "2" tube. The pharyngeal balloon and tracheoesophageal cuff are inflated via color-coded pilot balloons marked either "1" or "2" with the specified inflation volumes.

Figure 2

**PLACEMENT**

When placing the ETC blindly, the provider opens the mouth by grasping the lower jaw and tongue with his non-dominant thumb and index finger, pressing the tongue down, and manipulating the jaw forward.[12,19,20] (**Editor's note:** The ETC is only indicated in unconscious patients). The ETC is placed using curved, downward movement without force. An additional technique is to grasp the maxillary teeth with the index finger and push the jaw caudally with the middle finger.[20] This allows for greater spacing between the mandible and maxilla and a potentially easier insertion of the ETC. Placement of the ETC should follow the tongue, rather than the palate. To facillitate in successful insertion, the ETC should be bent between the pharyngeal balloon and the tracheoesophageal cuff in a "Lipp Maneuver" to pre-curve the device (Figure 3).[17,19,20] A laryngoscope can also be utilized without visualization to ease blind placement of the ETC (Figure 4).[13,17,19,20]

Figure 3

Figure 4

**CONFIRMATION OF PLACEMENT**

Demonstrate correct placement by noting the location of the black rings at the level of the incisors. Inflate the pharyngeal balloon via the blue "1" pilot balloon with 85ml of air or water (for higher altitude flights) (41F: 100ml), then inflate the tracheoesophageal cuff via the white "2" pilot balloon with 12ml of air or water (41F: 15ml). Note that the ETC may move as the pharyngeal balloon seats itself in the posterior pharynx. Figure 3 shows correct final placement of the ETC.

Once the tube is correctly placed and the balloon is inflated, test ventilation through the blue "1" tube first due to the high probability of proper insertion into the esophagus. Auscultate the lungs and epigastrium. If lung sounds are heard and there are no gastric sounds, then the ETC is properly emplaced in

the esophagus and the operator can continue to ventilate the patient via the blue "1" tube. If there are positive epigastric sounds and no lung sounds, then attempt ventilation via the shorter, clear "2" tube. Assess the patient as before. If lung sounds are present without epigastric sounds, then the ETC is in the trachea. Continue ventilation via the "2" tube. In order to keep the ETC secured, the pharyngeal balloon remains inflated.

Use devices such as the esophageal detector device (EDD; self-inflating bulb) and end-tidal $CO_2$ ($ETCO_2$) detector to confirm proper placement and ventilation, particularly in environments where auscultation is not possible or practical (e.g., aboard a helicopter.)[12,19,21-23] After placement of the ETC, the EDD is depressed, placed on the clear "2" tube, and released. Inflation should not occur if the ETC has been placed in the esophagus (Figure 5). Conversely, attachment of the EDD to the blue "1" tube should result in rapid inflation.[21,22] If EDD inflation does not occur when attached to the blue "1" tube despite confirmed esophageal placement, then glottic occlusion should be suspected (Figure 6).[22] Use of colormetric $ETCO_2$ is indicated in the setting of adequate ventilation. Colormetric $ETCO_2$ is 100% sensitive when ventilation occurs either directly or indirectly to the lungs. False "positives" may occur for up to six breaths with exhaled air from the esophagus.[23] The EDD or $ETCO_2$ enhances provider ability to confirm placement and perform successful ventilation.

### Limitations & Special Considerations

Use of the ETC is contraindicated by the manufacturer for patients less than four feet tall regardless of age. Other ETC contraindications listed by the manufacturer include the presence of a gag reflex, known caustic substance ingestion, and upper airway obstruction. Additionally, they recommend

Figure 5

Figure 6

the ETC be kept in place for no longer then 8 hours due to the possibility of pressure-induced pharyngeal tissue ischemia.[19]

Occlusion of the glottic opening can occur. If no sounds are heard during auscultation, this may mean the ETC has been placed too deeply while in the esophageal position.[12,17,19] The pharyngeal balloon occludes the glottic opening, preventing passage of air. In this instance, deflate both the pharyngeal balloon and tracheoesophageal cuff and pull the ETC back 2-3cm. Re-inflate the balloon and cuff and confirm proper placement again.

### Use

The role of the ETC as a primary airway device and as a rescue airway device makes it very appealing in the pre-hospital environment. There are several areas where this device has been effective in very diverse patient populations:

#### *ETC in Cardiac Arrest*

Several studies show the efficacy of the ETC in ventilating cardiac arrest patients. In a retrospective study Tanigawa and Shigematsu evaluated the choice of airway devices for 12,020 out-of-hospital cardiac arrests.[24] The rate of successful insertion and ventilation was more frequent for the ETC, compared to the laryngeal mask airway (LMA) and the esophageal gastric tube airway (EGTA). In a modified, randomized crossover study by Rumball et al., they evaluated Canadian Emergency Medical Assistants (EMA) on the use of the ETC.[25] The participants in the study were part-time clinicians with no advanced airway skills, working in a non-urban, low call area with no advanced airway skills. Over a four-and-a-half year period, the ETC had the highest successful insertion and ventilation rate (86%), compared to the LMA and pharyngeal-tracheal lumen airway. Most of the participants preferred the ETC for its ease of use during and after placement.

LaFrancois et al., reported a series of 760 patients treated by Canadian emergency medical technicians with defibrillator training and no advanced airway skills, during which the ETC was correctly placed in 95.4% of the patients, with a first time success rate of 79.7%.[26]

Staudinger et al., and Rabitsch et al., published two comparative studies that evaluated the ETC versus endotracheal intubation in the cardiac arrest patient. Staudinger sought to evaluate the effectiveness of ETC placement in the ICU by nurses untrained in endotracheal intubation versus physicians trained in this skill.[27] Successful insertion and blood gas analysis were utilized as end-points to evaluate the efficacy of the ETC. After two hours of classroom instruction, the participants practiced insertions on manikins until they could successfully insert the ETC. Results in ICU patients showed no statistical differences in blood gases or outcomes and a faster insertion rate for the ETC. The only pre-hospital study was by Rabitsch et al., who conducted a prehospital study comparing ETC and endotracheal intubation in cardiac arrest patients by physicians working in a European EMS system.[28] Initial ETC placement was 98% successful with the remaining 2% successfully managed with endotracheal intubation. In contrast, ETT was 94% successful with the remaining 6% managed using the ETC. Differences in initial successful placement of the ETC and ETT were not statistically significant.

*Use of the ETC in Surgical Patients*

Use of the ETC in elective surgery has demonstrated good success. Gaitini et al., published a report of ETC use in 200 surgical cases.[29] They evaluated ETC use in spontaneously breathing patients and patients who were fully relaxed and mechanically ventilated. Surgery in the mechanically ventilated group, included, but was not limited to, intra-abdominal, extra abdominal, gynecological, and orthopedic surgery. The ETC was successful in 97% of the patients studied. Hemodynamic parameters remained stable throughout the procedures. Failures included difficult or unacceptable ventilation and high ventilating pressures. Hartman et al., evaluated the ETC 37F SA against endotracheal intubation in patients undergoing laparoscopic surgery.[30] Results demonstrated that the ETC 37F SA was useful in all patients regardless of their size; however, 16% of the patients required some adjustment of the device due to placement too deep.

In several studies, the ETC was evaluated using the "minimal leak technique" in patients during surgery.[30,31] Once the ETC was placed, a minimal amount of air was used to inflate the pharyngeal balloon to prevent leakage at inspiratory pressures of 20-30cm $H_2O$. It is thought that use of the minimal leak technique during elective procedures reduces the risk of soft tissue trauma. While the minimal leak technique may be useful under controlled conditions, there are no noted guidelines or suggestions for its use in the emergent setting.

*Trauma*

Several studies describe the use of the ETC in trauma.[32-34] A pilot study of flight nurses using the ETC as a rescue airway device in trauma patients and found it effective even in the setting of facial injuries.[32] Several studies have shown the effectiveness of the ETC as an adjunct for paramedic rapid sequence intubation (RSI) when orotracheal intubation is unsuccessful. In one study the ETC was successful in 96.7% of intubation attempts.[34] Ochs et al., also showed it to be an effective rescue device for out-of-hospital RSI for head injured patients when endotracheal intubation could not be performed.[35] In this study the ETC in combination with ETT allowed paramedics to effectively and safely administer prehospital RSI in the urban environment. The ETC has also been shown to contribute to hemostasis in maxilofacial trauma. Klauser et al., reported a case where the ETC was successfully placed in a patient with severe upper airway bleeding following fibrinolytic use.[36] The authors noted that placement of the ETC controlled the bleeding in the hypopharynx. There is one additional case report of the ETC being used to control oral-pharyngeal bleeding, despite placement of a surgical airway.[37] ETC placement was accomplished after several attempts to control oronasal bleeding failed in a patient with multiple maxillofacial fractures. The pharyngeal balloon of the ETC was used to seal the hypopharynx along with Foley balloon catheters. Bleeding was controlled, and the ETC kept in place until the patient could be embolized.

*Difficult airways*

The American Society of Anesthesiologists Task Force on Management of the Difficult Airway and the American Heart Association recommend use of the ETC when intubation problems occur in patients with a previously unrecognized difficult airway, especially in a "cannot ventilate, cannot intubate" situation.[1,38] There are several reports of the

effective use of the ETC as rescue airway device.[39-43] Blostein, et al was the first to report the use of the ETC for failed intubation following RSI of trauma patients.[32] Flight nurses were trained to use the ETC by attending didactic and video training along with manikin simulations. The one-year prospective study showed a successful placement rate of 100%. During the landmark San Diego Rapid Sequence Intubation Trial, paramedics used the ETC after three failed attempts at endotracheal intubation.[34] ETC placement was 95% successful as an airway rescue device with no reported complications. The ETC appeared to be an effective and safe rescue device for pre-hospital airway management within this well-designed study.

**COMPLICATIONS**

Reported complications with use of the ETC are rare. Tangawa and Shigematsu noted a 0.6% (9 cases) complication rate in 1,594 cases using the ETC. Complications were all associated with soft tissue injury.[24] Likewise, Vezina et al., reported a 0.7% (eight cases) complication rate on 1,139 patients using the ETC including three cases of esophageal lacerations.[44] This was attributed to the over inflation of the distal cuff . A cadaver study performed by Vezina et al., showed that there was obvious bulging of the anterior portion of the esophagus after ETC placement.[45] The bulging became more pronounced when the distal cuff was inflated with the recommended amount of air. Thus Vezina hypothesized that the stiff design, curvature of the ETC, and over-inflation of the distal cuff may all contribute to the complications associated with the ETC.

In two of the reports of ETC use in surgery, the authors assessed the incidence of complications with the ETC.[30,31] In each of these reports, the authors noted a small amount of blood in the oropharynx and some minor soft tissue damage. None of the complications were noted to be serious. In both studies, the 37F SA was used. During one study, the minimal leak technique was used to reduce soft tissue injury.[30]

There are anecdotal reports of wrong-tube ventilation occurring, typically when the bag-valve, or ventilator circuit becomes disconnected from the ETC. Some civilian air medical crews address this potential problem by blocking the unused tube with either the provided suction catheter or elbow (Figures 7 & 8). Use of the suction catheter effectively blocks the unused tube.

Esophageal placement of the ETC prevents a direct path to the trachea and lungs. Suctioning tracheal secretions is therefore impossible. This may be problematic in the patient that has aspirated prior to placement of the ETC. There are currently no known solutions to this problem in the prehospital environment.

Figure 7

Figure 8

**ETC APPLICATION IN THE MILITARY ENVIRONMENT**

Evaluation of the use of the ETC by military personnel in the combat environment is limited in the current medical literature.[32] A prospective, randomized, cross-over study authored by Calkins and Robinson compared the ETC versus the LMA and the ETT. After receiving instruction on the use of each device, Navy SEAL and Marine Reconnaissance Combat Corpsmen randomly inserted each device under simulated combat conditions on a variety of evacuation platforms. Each device was then evaluated based on speed of successful insertion and participant evaluation of the usefulness of each device.

Twelve providers made a total of 36 placements during the study, with each participant using all devices. The LMA was fastest, with a mean time of 22.3 seconds, the ETT with 36.5 seconds, and the ETC with a mean time of 40 seconds. There was no statistical difference in the number of attempts needed between each device. Following the study, the participants were asked to evaluate each device and their ease of use. Comparisons were made between each device. Though the participants favored the LMA over the ETC for ease of use, the majority favored the ETC over the LMA due

to its overall usefulness. When asked which device they would carry during a mission, all twelve said the ETT, nine the ETC, and three the LMA.

## Application To The Special Operations Environment

The ETC is a rapid, simple, and secure airway control device that can be placed without the need for direct laryngoscopy or head and neck movement.[13] It is effective in either the tracheal or esophageal positions and can be mastered and maintained with relatively little formal training.[46] There are many advantages of this device in the austere prehospital tactical environment of special operations. The low light, high noise, and confined space environment does not lend itself to conventional endotracheal intubation. The use of the ETC for immediate airway control in the "warm zone" or during CASEVAC could allow the special operations provider to rapidly gain airway control with a high degree of certainty. Using the ETC, the provider only needs to ascertain the appropriate depth placement and which tube to ventilate. A simple pulse oximetry reading and use of the EDD or ETCO2 would confirm proper placement. Moreover, the use of the ETC has been validated in patients with special injuries, including those with maxiofacial trauma, and spinal cord injuries.[32,35,37,40,47,48] The ETC has also proven useful as a bridging device during cricothyroidotomy.[49] The self-securing nature of this device is particularly useful and decreases the chances of dislodgement during patient movement and evacuation.

## Conclusion

Airway management using the ETC has been demonstrated to be an easily learned skill with a high success rate and only rare complications. The ETC's small durable packaging and ease of use in suboptimal environments, such as low light and limited access to the patient's head, make it a particularly attractive airway adjunct for the special operations community. SOF medical personnel should strongly consider carrying the ETC as a bridging device until a more definitive airway can be established in a controlled setting or as a rescue option when other airway means have failed.

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# The Impact of Hypoxia and Hyperventilation on Outcome after Paramedic Rapid Sequence Intubation of Severely Head-Injured Patients

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**BACKGROUND:** An increase in mortality has been documented in association with paramedic rapid sequence intubation (RSI) of severely head-injured patients. This analysis explores the impact of hypoxia and hyperventilation on outcome. **METHODS:** Adult severely head-injured patients (Glasgow Coma Scale score of 3–8) unable to be intubated without neuromuscular blockade underwent paramedic RSI using midazolam and succinylcholine; rocuronium was administered after confirmation of tube position. Standard ventilation parameters were used for most patients; however, one agency instituted use of digital end-tidal carbon dioxide ($ETCO_2$) and oxygen saturation ($SpO_2$) monitoring during the trial. Each patient undergoing digital $ETCO_2/SpO_2$ monitoring was matched to three historical nonintubated controls on the basis of age, gender, mechanism, and Abbreviated Injury Scale scores for each of six body regions. Logistic regression was used to explore the impact of oxygen desaturation during laryngoscopy and postintubation hypocapnia and hypoxia on outcome. The relationship between hypocapnia and ventilatory rate was explored using linear regression and univariate analysis. In addition, trial patients and controls were compared with regard to mortality and the incidence of "good outcomes" using an odds ratio analysis. **RESULTS**: Of the 426 trial patients, a total of 59 had complete $ETCO_2/SpO_2$ monitoring data; these were matched to 177 controls. Logistic regression revealed an association between the lowest $ETCO_2$ value and final $ETCO_2$ value and mortality**.** Matched controls analysis confirmed an association between hypocapnia and mortality. A statistically significant association between ventilatory rate and $ETCO_2$ value was observed ($r$ =-0.13, $p < 0.0001$); the median ventilatory rate associated with the lowest recorded $ETCO_2$ value was significantly higher than for all other $ETCO_2$ values (27 mm Hg vs. 19 mm Hg, $p < 0.0001$). In addition, profound desaturations during RSI and hypoxia after intubation were associated with higher mortality than matched controls. Overall mortality was 41% for trial patients versus 22% for matched controls (odds ratio, 2.51; 95% confidence interval, 1.33–4.72; $p = 0.004$). **Conclusions:** Hyperventilation and severe hypoxia during paramedic RSI are associated with an increase in mortality.

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The role of secondary insults, including hypoxia and hypotension, in traumatic brain injury is well established, with multiple investigators documenting their association with increased mortality.[1–4] Unfortunately, many patients cannot be easily intubated without the use of medications because of intact airway reflexes and inadequate jaw muscle relaxation.[5–7] This has led to the institution of aggressive prehospital airway protocols, including the use of neuromuscular blockers by aeromedical crews and

select paramedic agencies.[8,9] It is clear that the use of these agents as part of rapid sequence intubation (RSI) protocols leads to an increase in intubation success; however, the ultimate effect on outcome is unknown.[6,7,10–13] Our own experience with paramedic RSI includes a dramatic increase in the intubation success rates for head-injured patients with a Glasgow Coma Scale (GCS) score of 8 or less and an airway success rate of 99%, including 84% orotracheal intubations and 15% using the Combitube (The Kendall Company, Mansfield, MA).[7,14] The initial outcomes analysis, however, revealed an increase in mortality for RSI patients versus matched, nonintubated controls from the same prehospital system.[15] The challenge now exists to determine the cause of this mortality increase. The present study explores the impact of hypoxia and hypocapnia on outcome in patients undergoing RSI for severe traumatic brain injury. In addition, the relationship between hypocapnia and ventilatory rate is determined.

## Patients and Methods

### *Design*

The San Diego Paramedic RSI Trial prospectively enrolled patients from the entire county; this analysis focuses on a subset of patients undergoing more intensive monitoring. These patients were matched to historical nonintubated controls from the same prehospital system. The enrollment period for this analysis was from November 1998 through April 2002, representing the entire duration of the trial. Waiver of consent was granted by the California State EMS Authority and from the investigational review board for each participating institution.

### *Setting and Prehospital System*

San Diego County has a population of approximately 3 million and an area of 4,261 square miles. Advanced life support (ALS) is provided by 12 different agencies, with all but one agency participating in the trial. Approximately 30% of the over 100,000 transports each year are related to major or minor trauma. Five designated adult trauma centers receive all major trauma victims. Participating paramedics attended an 8-hour training course to learn the RSI procedure and medications, GCS scoring, and ventilation procedures.

The city of San Diego has a population of 1.3 million residing in an area of approximately 400 square miles. The city ALS provider enrolled approximately one third of the trial patients. Midway through the trial, this agency instituted the use of continuous recording handheld oximeter-capnometer devices on all transport units. This analysis focuses on the subgroup of trial patients undergoing more intensive monitoring with these devices.

### *Subjects*

The San Diego Paramedic RSI Trial targeted adult major trauma victims with severe traumatic brain injury. Inclusion criteria were as follows: apparent age 18 years or older, major trauma victim according to county protocols, suspected head injury by mechanism or physical examination findings, GCS score of 3 to 8, and estimated time for transport to the resuscitation suite 10 minutes or greater. Paramedics attempted intubation without RSI medications; if this was unsuccessful because of a clenched jaw or intact airway reflexes, patients were enrolled in the trial. Exclusion criteria included ongoing cardiopulmonary resuscitation before administration of RSI medications or the inability to achieve intravenous access.

### Interventions

Trial patients were preoxygenated for a minimum of 60 seconds using a nonrebreather mask before administration of RSI medications; bag-valve-mask ventilations were instituted if oxygen saturation ($SpO_2$) remained below 95%. Midazolam and succinylcholine were administered before laryngoscopy; rocuronium was administered to maintain paralysis during transport after confirmation of tube position. A simplified, weight-stratification dosing system was

**Table 1** Rapid Sequence Intubation Medication Protocols Used during the Trial[a]

| | Small, 80–140 lb (35–63 kg) | Average, 141–225 lb (63–100 kg) | Large, >225 lb (>100 kg) |
|---|---|---|---|
| Midazolam | 2 mg | 2.5 mg | 3.0 mg |
| Succinylcholine | 4 ml (80 mg) | 6 ml (120 mg) | 8 ml (160 mg) |
| Rocuronium | 4 ml (40 mg) | 6 ml (60 mg) | 8 ml (80 mg) |
| Morphine | 2 mg every 10 min for "stress response" (SBP > 140 mm Hg, HR > 100 beats/min) | | |

SBP, systolic blood pressure.
[a] This simplified dosing strategy allowed for a constant volume of paralytic medication for patients in a given weight stratification.

used (Table 1). The Combitube was used as a salvage airway device, with CTI mandated after a maximum of three unsuccessful orotracheal intubation (OTI) attempts. If all intubation attempts were unsuccessful, further laryngoscopy attempts were abandoned and bag-valve-mask ventilation performed until spontaneous respirations resumed. Paramedics were taught standard ventilation parameters of 12 breaths/min and a tidal volume of 800 mL; practice with a stopwatch and spirometer was incorporated into the training session.

During the second year of the trial, the San Diego City ALS provider instituted the use of continuous recording handheld oximeter-capnometer devices. The Novametrix Tidal Wave Model 710 (Tidal Wave, Novametrix Medical Systems, Inc., Wallingford, CT) is a handheld in-line oximeter-capnometer with a finger clip $SpO_2$ sensor and single-use infrared end-tidal carbon dioxide ($ETCO_2$) adaptor. The device records $SpO_2$, $ETCO_2$, heart rate, and ventilatory rate at 8-second intervals. These data can be downloaded at a later time for analysis. Paramedics from this agency were instructed to adjust ventilation parameters to target an $ETCO_2$ value of 30 to 35 mm Hg.

### Data Collection

Data for every trauma patient meeting Major Trauma Outcome Study criteria are entered into a county trauma registry. In addition, a field worksheet served as both a protocol guide and a data collection tool for RSI trial patients, with one of the principal investigators paged immediately after delivery of each patient for a 15-minute telephone debriefing to record prehospital data and confirm proper GCS score calculation. Data from the oximeter-capnometer devices were exported to an Excel (Microsoft Corp., Redmond, WA) spreadsheet for further analysis.

### Statistical Analysis

The primary objective for this analysis was to determine the impact of hypoxia and hypocapnia on outcome after paramedic RSI of severely head-injured patients. Patients were excluded from this analysis for the following: inability to be intubated (OTI or CTI) by prehospital personnel after administration of RSI mediations; failure to fulfill Major Trauma Outcome Study criteria; Head/Neck Abbreviated Injury Scale (AIS) score less than 2 or defined by a neck injury; death before admission or in the resuscitation suite within 30 minutes of arrival; and incomplete or inadequate oximeter-capnometer data.

Logistic regression was used to explore the relationship between hypoxia and hypocapnia on outcome, controlling for age, gender, Head/Neck AIS score, Chest AIS score, Abdomen AIS score, and mechanism of injury. Adjusted odds ratios were calculated for the following oximeter-capnometer variables: lowest preintubation $SpO_2$ recorded; length of desaturation, defined as the duration of preintubation $SpO_2$ below 90%; lowest postintubation $SpO_2$ recorded; lowest ETCO2 value recorded; and final $ETCO_2$ recorded (Figure 1).

**Figure 1.** *Outcome variables used in logistic regression analysis included duration of preintubation $SpO_2$ below 90% (A); lowest preintubation $SpO_2$ recorded (B), lowest postintubation $SpO_2$ recorded (C), lowest $ETCO_2$ value (D), and final $ETCO_2$ value (E).*

The relationship between hypocapnia and ventilatory rate was explored using both logistic regression and univariate analysis. Linear regression was used to determine the association between recorded $ETCO_2$ values and ventilatory rate. Data from the first 90 seconds after intubation were excluded to allow for an equilibration period; these data were felt to reflect the duration of apnea during laryngoscopy rather than the effect of ventilations after intubation. To control for variability in tidal volume between different paramedics, the changes in $ETCO_2$ and ventilatory rate from the first included value were used for analysis. In addition, the mean and median ventilatory rate values recorded at the time of the lowest documented $ETCO_2$ were compared with all other recorded ventilatory rate values using parametric and nonparametric statistics.

The impact of hypoxia and hypocapnia on outcome was also explored using an odds ratio analysis. Each RSI patient was matched to three nonintubated, historical controls from the county trauma reg-

istry using the following criteria: age, sex, mechanism of injury, trauma center, Injury Severity Score, Head/Neck AIS score, Face AIS score, Chest AIS score, Abdomen AIS score, Extremities AIS score, and Skin AIS score. Controls were excluded for death before admission or in the resuscitation suite within 30 minutes of arrival and if the Head/Neck AIS score was defined by a neck injury. Matching was performed independent of previous analyses by a single investigator blinded to outcome. For each of the variables explored in the logistic regression analysis, trial patients were stratified into three approximately equal groups, with odds ratios used to quantify the relative mortality difference between trial patients and their matched controls. Parametric and nonparametric statistics were also used when appropriate to compare trial patients and controls with regard to matching parameters and other clinical variables. Statistical significance was attributed to a value of $p < 0.05$. Statistical calculations were performed using StatsDirect (StatsDirect Software, Inc., Ashwell, UK).

**Table 2** Comparison between Patients Meeting Inclusion Criteria for This Analysis in Whom Oximeter-Capnometer Devices Were Used (n = 59) vs. Those in Whom the Devices Were Not Used (n = 38)

| Parameter | RSI | Controls | p Value |
|---|---|---|---|
| Demographics | | | |
| Age (years) | 38 | 31 | 0.042 |
| Male sex (%) | 83 | 94 | 0.052 |
| Blunt mechanism of injury (%) | 85 | 90 | 0.606 |
| Prehospital course | | | |
| GCS score | 5.0 | 4.9 | 0.579 |
| RSI performed on scene (%) | 59 | 71 | 0.215 |
| Number of intubation attempts | 1.5 | 1.5 | 0.744 |
| Endotracheal intubation (%) | 88 | 97 | 0.075 |
| Abbreviated Injury Scale scores (mean values) | | | |
| Head/Neck | 3.9 | 3.5 | 0.179 |
| Face | 0.5 | 0.5 | 0.959 |
| Chest | 1.2 | 1.0 | 0.604 |
| Abdomen | 0.5 | 0.9 | 0.294 |
| Extremities | 0.9 | 1.0 | 0.549 |
| Skin | 0.9 | 0.9 | 0.607 |
| ISS | 26.6 | 25.4 | 0.694 |
| Arrival parameters | | | |
| SBP (mm Hg) | 135 | 130 | 0.490 |
| pH | 7.34 | 7.34 | 0.999 |
| $Po_2$ (mm Hg) | 299 | 277 | 0.509 |
| $Pco_2$ (mm Hg) | 38.2 | 39.9 | 0.073 |
| Base deficit | −4.9 | −3.4 | 0.346 |
| Serum ethanol (mg/dL) | 107 | 191 | 0.060 |
| Hospital course | | | |
| Days in ICU | 7.0 | 6.4 | 0.772 |
| Days in hospital | 10.4 | 12.7 | 0.394 |
| Mortality (%) | 41 | 32 | 0.292 |
| Good outcome (%) | 41 | 50 | 0.406 |

ISS, Injury Severity Scale; SBP, systolic blood pressure; ICU, intensive care unit.

## RESULTS

A total of 426 patients were enrolled in the trial; two of these were intubated before paramedic contact but received midazolam and rocuronium for paralysis during transport. In addition, three patients did not receive succinylcholine, and another received a tenth of the protocol dose; none of these achieved appropriate relaxation for intubation. A total of 355 of the remaining 420 patients (84.5%) underwent successful OTI, and 58 (13.8%) underwent successful CTI. The San Diego City ALS provider enrolled 152 of the 426 trial patients (36%). Continuous oximetry-capnometry was introduced by this agency in March 2000, with 59 patients meeting inclusion criteria for this analysis. An additional 43 patients were transported after March 2000 but were excluded for the following reasons: oximeter-capnometer device not used (n = 12); detached SpO2 monitor during RSI procedure (n =16); dead battery (n = 8); and corrupt data (n = 7). Of the 43 patients transported by San Diego City ALS providers after institution of oximeter-capnometer devices, 38 would have met inclusion criteria for this analysis; these patients were similar to those included in this analysis with regard to demographics, injury severity, and clinical course (Table 2). Table 3 displays results from the logistic regression analysis, exploring the impact of various pre- and

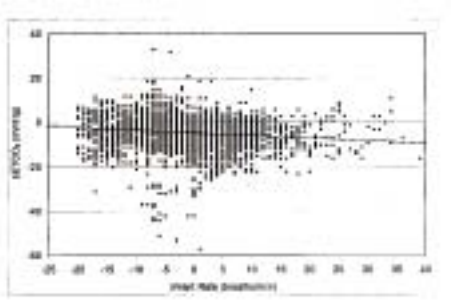

**Figure 2.** *Linear regression analysis documenting a statistically significant association between the changes in $ETCO_2$ and ventilatory rate after a 90-second equilibration period (r 0.13, p 0.0001).*

**Table 3** Logistic Regression Analysis of Pre- and Postintubation Factors Using Mortality as the Outcome Measure[a]

| RSI Factor | Adjusted OR (95% CI) |
|---|---|
| Preintubation | |
| Lowest $Spo_2$ | 0.31 (0.06–1.56) |
| Duration of desaturation | 1.52 (0.69–3.35) |
| Postintubation | |
| Lowest $Spo_2$ | 1.39 (0.35–5.55) |
| Lowest $ETCO_2$ | 7.71[b] (1.09–59.07) |
| Final $ETCO_2$ | 9.94[b] (1.04–94.68) |

OR, odds ratio; CI, confidence interval.

[a] Odds ratios are adjusted for age, sex, Head/Neck AIS, Chest AIS, Abdomen AIS, and mechanism of injury and are reported for a 10% change in $Spo_2$ (lowest pre- and post-$Spo_2$), a 10-mm Hg change in $ETCO_2$ (lowest and final $ETCO_2$), and per minute (duration of desaturation).

[b] $p < 0.05$.

**Table 4** Age, Sex, Mechanism of Injury, Abbreviated Injury Scale Scores, and ISS for the RSI Cohort (n = 59) vs. Pooled Matched Controls (n = 177)

| Parameter | RSI (%) | Controls (%) | p Value |
|---|---|---|---|
| Demographics | | | |
| Age (yr) | 28.1 | 26.9 | 0.641 |
| Male sex | 91.2 | 91.2 | >0.999 |
| Mechanism of injury | | | |
| Motor vehicle crash | 22.0 | 22.0 | >0.999 |
| Fall | 22.2 | 22.2 | >0.999 |
| Assault | 1.7 | 1.7 | >0.999 |
| Bike accident | 8.5 | 8.5 | >0.999 |
| Motorcycle crash | 2.4 | 2.4 | >0.999 |
| Pedestrian vs. automobile | 11.9 | 11.9 | >0.999 |
| Gunshot wound | 13.6 | 13.6 | >0.999 |
| Found down | 2.4 | 2.4 | >0.999 |
| Other | 2.4 | 2.4 | >0.999 |
| Abbreviated Injury Scale scores | | | |
| Head/Neck (mean) | 2.92 | 2.92 | >0.999 |
| 2 | 18.6 | 18.6 | >0.999 |
| 3 | 13.6 | 13.6 | >0.999 |
| 4 | 25.4 | 25.4 | >0.999 |
| 5 | 42.4 | 42.4 | >0.999 |
| Face (mean) | 0.46 | 0.60 | 0.309 |
| 0 | 76.2 | 69.9 | 0.293 |
| 1–2 | 18.6 | 24.9 | 0.329 |
| 3+ | 5.1 | 5.2 | 0.750 |
| Chest (mean) | 1.17 | 1.24 | 0.700 |
| 0 | 67.9 | 69.8 | 0.592 |
| 1–3 | 15.9 | 15.9 | >0.999 |
| 4–5 | 15.2 | 19.2 | 0.466 |
| Abdomen (mean) | 0.59 | 0.67 | 0.475 |
| 0 | 83.1 | 76.8 | 0.215 |
| 1–3 | 11.9 | 17.5 | 0.307 |
| 4–5 | 5.1 | 5.6 | 0.869 |
| Extremities (mean) | 0.69 | 0.77 | 0.757 |
| 0 | 64.4 | 69.5 | 0.469 |
| 1–2 | 22.0 | 14.1 | 0.152 |
| 3+ | 13.6 | 16.4 | 0.605 |
| Skin (mean) | 0.90 | 1.09 | 0.016 |
| 0 | 35.6 | 19.1 | 0.005 |
| 1+ | 64.4 | 81.9 | 0.005 |
| ISS (mean) | 25.2 | 26.6 | 0.957 |

ISS, Injury Severity Score.

postintubation parameters on mortality after adjusting for age, gender, Head/Neck AIS score, Chest AIS score, Abdomen AIS score, and mechanism of injury. A statistically significant effect of lowest and final $ETCO_2$ on mortality was observed. A statistically significant association was observed with regard to the changes in $ETCO_2$ and ventilatory rate values from baseline ($r$ = -0.13, $p$ < 0.0001). This relationship is displayed graphically in Figure 2. In addition, the mean and median ventilatory rate values recorded in association with the lowest observed $ETCO_2$ were significantly higher than all other ventilatory rate values (mean, 28.8 vs. 20.6 mm Hg, p< 0.0001; median, 27 vs. 19 mm Hg, $p$ < 0.0001). This is displayed graphically in Figure 3. These data suggest that the observed hypocapnia was a result of excessively high ventilatory rates.

Table 4 displays data regarding demographics, mechanism of injury, and matching parameters for trial patients (n = 59) and their matched controls (n = 177). The only statistically significant difference between the groups was for Skin AIS score, with trial patients having lower values than controls (0.80 vs. 1.04); this likely had little clinical significance. Table 5 displays values for arrival systolic blood pressure, arterial blood gas data, and serum ethanol. Of note, $PO_2$ was significantly higher in trial patients than in controls.

The mortality in RSI patients was 40.7% versus only 21.5% for matched controls (odds ratio, 2.51; 95% confidence interval, 1.33–4.72; $p$ < 0.01). Table 6 displays mortality for RSI patients stratified by various factors related to oxygenation and ventilation as compared with their matched controls. Both the lowest and final $ETCO_2$ values were associated with increased mortality versus matched controls. In addition, there appeared to be an adverse effect of profound desaturations during RSI and hypoxia after intubation.

**Table 6** Odds Ratio Analysis of Pre- and Postintubation Factors Comparing RSI Trial Patients to Their Matched Controls[a]

| RSI Factor | No. | Mortality for RSI Patients (%) | Mortality of Matched Controls (%) | Odds Ratio (95% CI) |
|---|---|---|---|---|
| During RSI | | | | |
| Lowest $Spo_2$ (%) | | | | |
| ≥90% | 16 | 37.5 | 14.6 | 3.51 (0.97–12.78) |
| 70–89% | 17 | 35.3 | 29.4 | 1.31 (0.41–4.19) |
| <70% | 16 | 43.7 | 15.7 | 3.99[b] (1.12–13.52) |
| Duration of desaturation | | | | |
| 0 s | 15 | 40.0 | 15.6 | 3.52 (0.99–12.42) |
| 1–120 s | 15 | 26.7 | 15.6 | 1.97 (0.49–8.00) |
| >120 s | 19 | 50.0 | 27.9 | 2.60 (0.87–7.80) |
| Postintubation | | | | |
| Lowest $Spo_2$ | | | | |
| >95% | 19 | 21.1 | 12.2 | 1.90 (0.49–7.40) |
| 90–95% | 17 | 47.1 | 21.6 | 3.23[b] (1.01–10.34) |
| <90% | 16 | 56.2 | 25.0 | 3.96[b] (1.19–12.61) |
| Lowest $ETCO_2$ value | | | | |
| >27 mm Hg | 19 | 22.2 | 15.7 | 1.49 (0.39–5.26) |
| 20–27 mm Hg | 19 | 47.4 | 21.1 | 3.32[b] (1.12–10.17) |
| <20 mm Hg | 17 | 47.1 | 19.6 | 3.54[b] (1.12–11.92) |
| Final $ETCO_2$ value | | | | |
| >32 mm Hg | 17 | 29.4 | 17.6 | 1.94 (0.55–6.91) |
| 24–32 mm Hg | 19 | 44.4 | 22.2 | 2.80 (0.90–8.66) |
| <24 mm Hg | 19 | 42.1 | 15.8 | 3.99[b] (1.22–12.32) |

CI, confidence interval.
[a] Trial patients were stratified for each of the factors explored in the logistic regression analysis.
[b] $p$ < 0.05.

**Table 5** Arrival SBP, Arterial Blood Gas Values, and Serum Ethanol for RSI Patients (n = 59) vs. Matched Controls (n = 177)

| | RSI | Controls | p Value |
|---|---|---|---|
| Arrival SBP | | | |
| Mean (mm Hg) | 143.5 | 133.7 | 0.119 |
| ≤90 mm Hg (%) | 9.5 | 9.0 | >0.999 |
| ABG data (mean) | | | |
| pH | 7.34 | 7.34 | 0.997 |
| $Po_2$ (mm Hg) | 301 | 241 | 0.042 |
| $Pco_2$ (mm Hg) | 39.0 | 39.5 | 0.929 |
| Base excess | −4.9 | −4.4 | 0.579 |
| Mean serum ethanol (mg/dL) | 123 | 107 | 0.621 |

SPB, systolic blood pressure; ABG, arterial blood gas.

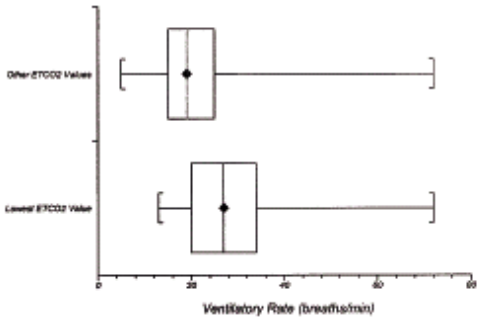


Figure 3. Box-and-whisker plot comparing ventilatory rate values associated with the lowest recorded $ETCO_2$ value versus all other $ETCO_2$ values. The brackets define the total range of values, the edges of each box define the lower and upper quartiles, and the single lines represent median values. A statistically significant difference between the two groups was observed (p 0.0001).

## Discussion

The preliminary analysis of San Diego Paramedic RSI Trial data documented an adverse effect of paramedic RSI on outcome when compared with matched controls.[15] Three possibilities exist to explain these results. The increase in mortality may reflect some hidden bias introduced by the study design, although trial patients and controls appeared to have been identical with regard to each of the factors that we examined, including demographics, mechanisms of injury, vital signs, AIS scores for each body system, computed tomographic scan diagnoses, and invasive procedures.[15] These results may also represent a true-negative effect of intubation on head injury. To date, the evidence in support of early intubation is tangential at best, with a growing number of studies documenting an association between early intubation and mortality.[16,17] The final possibility is that factors associated with the RSI procedure as performed in our trial were responsible for the increase in mortality, masking any potential benefit from the procedure. This is suggested by the high incidence of preintubation desaturation and postintubation hyperventilation observed in previous analyses.[15,18]

In this study, we explore the impact of these potentially avoidable factors on outcome. Our logistic regression model documents an independent association between both the lowest and final recorded $ETCO_2$ values and mortality; the lowest recorded $SpO_2$ value and duration of desaturation were not associated with an increase in mortality. The hypocapnia we observed appeared to be a result of excessively high ventilatory rates, as evidenced by both regression modeling and univariate analysis. The matched-controls analysis confirmed the adverse effect of hyperventilation on outcome. In addition, profound desaturations during RSI ($SpO_2$ < 70%) and hypoxia after intubation ($SpO_2$ < 90%) were both associated with higher mortality than in matched controls.

Both desaturations and hyperventilation represent errors in the performance of the RSI procedure and may explain some of the mortality increase we observed. It is interesting to note, however, that the absence of these factors did not lead to an improvement in survival over matched controls. Whether this reflects a true detrimental effect of early intubation on outcome or a form of selection bias in favor of controls should not detract from the most important findings of this analysis regarding the role of hyperventilation and deep desaturations on outcome in patients undergoing prehospital airway management. Future training and investigation involving prehospital intubation should address these issues to determine whether airway management with minimal complications leads to improved outcomes in patients with severe TBI.

Although hypoxia and hyperventilation are generally considered to be detrimental to the injured brain, little attention has been given to the impact of brief periods of hypoxia or hyperventilation during the resuscitation phase. Multiple studies have documented an association between early hypoxia and mortality in severely head-injured patients, although hypotension has consistently demonstrated a more profound effect.[1–4,19] None of these studies explored the impact of "iatrogenic" hypoxia in association with RSI. One group studied the effect of desaturations ($SpO_2$ < 92%) in patients undergoing RSI caused by severe traumatic brain injury and found no difference in outcome, even after controlling for the potential contributions of other clinical variables.[20] Their threshold value may have been too high, as we observed an adverse effect of hypoxia on outcome only with extreme desaturations ($SpO_2$ < 70%). Animal studies have documented an increase in neuronal death with brief (30 minutes) hypoxemia after experimental brain injury, although concurrent hypotension may have contributed to outcome in at least one of these.[21,22]

Stronger evidence exists for an immediate adverse effect of hyperventilation, although most studies have used surrogate endpoints, such as cerebral blood flow, tissue oxygenation, jugular venous oxygen saturation, and extracellular lactate and glutamate.[23–35] One notable exception is the multicenter trial performed by Muizelaar et al., which randomized severe-

ly head-injured patients to undergo moderate hyperventilation ($PCO_2$ = 25 mm Hg) or normal ventilation ($PCO_2$ = 35 mm Hg) for the first 5 days of hospitalization.[36] The increase in mortality observed in hyperventilated patients led to recommendations against the use of routine hyperventilation in traumatic brain injury. No previous investigators have explored the impact of prehospital hyperventilation on outcome.

Inadvertent hyperventilation is extremely common with manual ventilation, regardless of the personnel or setting.[37–41] We observed $ETCO_2$ values less than 25 mm Hg in 59% of patients for a mean duration of 390 seconds. This may have adverse effects on the injured brain through a variety of mechanisms. First, cerebral vasoconstriction with hypocapnia is well documented and can result in global ischemia through a decrease in cerebral blood flow as well as local ischemia, especially in critical areas of brain surrounding the primary injury.[23–35] Second, positive-pressure ventilation reverses the pattern of negative intrathoracic pressure associated with spontaneous respiration, potentially obstructing venous return and decreasing blood pressure and cardiac output; this occurs to a greater degree with increasing ventilatory rates.[42] Lastly, the increase in mean intrathoracic pressure that accompanies hyperventilation with positive-pressure ventilation can be transmitted in a retrograde fashion through the jugular venous system, raising intracranial pressure as a result. Recent data also suggest that injurious ventilation strategies lead to an increase in cytokine release, endothelial apoptosis, and mortality from both overinflation and from the absence of positive end-expiration pressure.[43–46] The specific characteristics of prehospital ventilation with regard to each of these factors has not been defined; however, it is possible that a lower $ETCO_2$ value is a surrogate marker for injurious ventilation. It is also notable that the increase in mortality observed in trial patients was consistent with our previous analyses, despite complete original matching of historical controls.[15] Trial patients and controls were identical with regard to all matching parameters as well as initial SBP and serum ethanol.

There was a predicted increase in arrival $PO_2$ for trial patients; however, mean $PO_2$ in controls was supratherapeutic at 241 mm Hg. In addition, there were no observed differences with regard to the above parameters between RSI patients and their matched controls when trial patients were stratified into those with and without recorded $ETCO_2$ values below 20 mm Hg. There were also no apparent differences between the two groups of trial patients that could account for the lower $ETCO_2$ values.

These data must be viewed in the context of study limitations. This subset of patients represents a relatively small percentage of the total group of trial patients, with limited power to find associations between the various factors and outcome. Nevertheless, we were able to identify hypocapnia caused by hyperventilation as a potential contributor. In addition, patients were not randomized to undergo hyperventilation versus normal ventilation, and hyperventilation may have been a surrogate marker for more severe injuries that were not detected by our analysis. Finally, data were not available regarding the prehospital oxygenation and ventilation of controls, although none was intubated in the field, avoiding the potentially detrimental effects of positive-pressure ventilation and hyperventilation.

## Conclusion

In this study, we explored the potential impact of hypoxia and hypocapnia on outcome in severely head-injured patients undergoing paramedic RSI. A relationship between hypocapnia and an increase in mortality was observed; in addition, this hypocapnia appeared to be a result of excessively high ventilatory rates despite protocols designed to target a ventilatory rate of 12 breaths/min. Matched controls analysis revealed worse outcomes in RSI patients versus matched controls, especially in the presence of any degree of hypocapnia and with deep desaturations during laryngoscopy.

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## Discussion

**Dr. Norman E. McSwain** (New Orleans, Louisiana): I am pleased to substitute for Dr. Johannigman, since he is in Iraq. The authors are to be congratulated for this study. First, they looked at the results of the RSI intubation study that they had conducted previously and found a significant difference. However, they went further by asking the question, why. It would be nice to know the exact comparison of the groups in the previous study and this group. They found that the differences are oxygen saturation of less than 70% during RSI, oxygen saturation after intubation greater than or less than 90% $ETCO_2$ less than 20 after intubation, and $ETCO_2$ less than 24 as a final factor.

This seems to be very important as we direct our own Emergency Medical Services (EMS) and return to our communities and institute changes to improve patient care. However, before we rush into making changes, there is more information that we need.

First, when we return to our EMS systems that may not be equipped with digital capnography, and most are not in the United States, what are we going to tell our EMS personnel to do? Don't hyperventilate the patient?

Unfortunately, the authors did not define this in terms Emergency Medical Technicians have the ability to control. The authors did not tell us exactly what ventilatory rates achieved the various $ETCO_2$ values that they felt were bad.

If you cannot supply those data today, I would suggest you include it in your final article. Otherwise, it's worthless information for medical directors in the United States.

Second, it concerns me that this was not a randomized study. If we're going to go home and make changes, do we know that these are actually compatible groups?

It seems to me that the patients were intubated on the basis of a GCS score of less than eight. However, in the historical control, we don't know what GCS score levels the controls had in the matching groups, and we don't have a GCS score comparison in those groups.

The authors pointed out in other studies that in-hospital $ETCO_2$ values kept at a lower level produced a bad outcome. Unfortunately, they did not tell us any of the in-hospital $CO_2$ values or any of the other variables within the hospital, which might make this an "apples and oranges" comparison. Would you please address this issue?

Fourth, this study discusses patients with RSI intubations, but patients that were intubated without RSI were not included. Is there a difference?

Fifth, if these were two matched groups of patients, why was there a difference in blood pressure in the RSI group, which was much higher, although

not statistically significant, than patients without head injuries?

Sixth, I would suggest that you change the title of your article and the selection of words throughout from "hyperventilation" to "decreased $ETCO_2$." Hyperventilation to the EMS community is a rate. You do not define this in rates. Therefore, it may be misleading to the medical directors.

Finally, now that you have found a worse outcome with RSI, do you still allow its use in your own system? If so, how can you justify its use? We wish Dr. Johannigman a good experience in Iraq and a fast, safe return, and I appreciate the opportunity to discuss this article.

**Dr. Jeffrey P. Salomone** (Atlanta, Georgia): I applaud the efforts to investigate the reasons why patients treated with RSI by paramedics had a worse outcome. My question focuses on what measures were taken to limit hypoxia and hypercarbia during the intubation attempts. Thank you for pursuing this investigation on a very important issue in prehospital care.

**Dr. Michael L. Hawkins** (Atlanta, Georgia): First, you did not discuss at all the transport times. In a closed, fairly small system in San Diego, it may be quite different from what I deal with in a semirural, fairly large state.

Second, you state that the bag-valve-mask is equally effective as intubation. How about patients with significant facial trauma or, on a personal level, patients with facial hair. It might be a bit of a problem to obtain a good seal.

Finally, it seems to me that your study really didn't show that RSI was dangerous but that the management after RSI was dangerous, and that alludes to several of the points Dr. McSwain already raised.

**Dr. Eileen M. Bulger** (Seattle, Washington): I have concerns similar to those of Dr. McSwain about the matching of the control groups and wonder whether you have data on the GCS score or the prehospital GCS scores of the controls. The other question I have is, do you have data on the intubation rates of the controls in the emergency department? If they were intubated in the emergency department, do you have any data on hypoxia during intubation in that setting?

**Dr. James Tyburski** (Detroit, Michigan): We've had a lot of interest in $ETCO_2$ relationships to the arterial $CO_2$. In our data of well over 500 patients undergoing surgery, we found that the difference was more important. Are there any data here comparing the difference between the $ETCO_2$ and the $PaCO_2$ values in the measurements? Thank you.

**Dr. Richard P. Dutton** (Baltimore, Maryland): I wanted to ask about the matching of controls, whether the authors made any effort to identify variables that might not show up in an AIS match but might influence the paramedic to intubate a patient in the field, such as combativeness, active aspiration, or acute pain.

**Dr. Graham** (Baltimore, Maryland): I just wanted to congratulate the authors on an article that supports our findings that we presented at the Western Association for the Surgery of Trauma meeting last year, but I do have one question. A recent article from Hellmann College in a randomized prospective trial using $ETCO_2$ monitoring of prehospital patients had found that $ETCO_2$ monitoring actually decreased hypoventilation and increased normal ventilation. My question is, why did your findings not also support these randomized prospective trial findings?

**Dr. Jean-Francois Pittet** (San Francisco, California): An important issue is allowing the paramedics to use paralytic agents for endotracheal intubation outside the hospital. I would like to know in how many cases there has been a failed intubation or a repeated attempt to intubate those patients. I think it's a critical issue here.

**Dr. Daniel Davis** (closing): Thank you very much, Dr. McSwain, especially because you had to fill in at the last minute and really only received the article last week. There are a lot of questions here, all of which are excellent, and I'm going to try to address them because I think these are important, especially for those who have some control over their EMS system.

I'm going to start with Dr. McSwain's questions. The respiratory rate data are actually going to be presented in a separate article but, given that the parameters given to the medics were that they should keep the respiratory rate around 12 breaths/min, it is significant to note that the mean maximum respiratory rate was approximately 50 breaths/min in these patients in whom $ETCO_2$ monitoring was performed.

We were able to show that the patients who had lower oxygen saturation values after intubation had higher respiratory rates, and so there may have been some attempt by the medics to improve oxy-

genation by increasing respiratory rate; however, in a regression analysis, there was no relationship between the oxygen saturation and the respiratory rate. So I think that's an important issue that needs to be addressed, and I'll talk more about that.

I think the biggest limitation of this study is that it's not randomized, and several people have brought that up. Also, there may have been inherent biases in the control group or in favor of the control group.

We have looked at multiple aspects of the matching, including the actual computed tomographic scan diagnoses, and that's presented in a separate article, and have not been able to show any particular difference that could account for the differences in outcomes. So thus far, we have not observed that there is some bias or some inherent difference between the groups; however, one question was regarding the GCS score, which was not routinely calculated in the field before this study, but was instead entered in by a Mobile Intensive Care Nurse based on data given to the medics, which is notoriously inaccurate, and so that may be a hidden bias that we can't account for and we'll never know, and only a prospective randomized trial would be able to answer this question.

With regard to the absence of hospital data in this particular analysis, our previous analyses have demonstrated that there is a correlation between arrival $PCO_2$ and outcome, and so hyperventilation or hypocapnia would probably be the preferred term. It does appear to have an effect no matter how we look at it, whether it's through $ETCO_2$ monitoring or arrival blood gas.

An important question with regard to patients intubated with RSI and that will be published I believe this month or next month in the *Journal of Trauma* concerned a comparison between the first year of the trial and the previous year. We actually noted that the percentage of patients intubated without RSI medications went up during the trial, and so our concern was that patients who could have been intubated without medication would be given medication as part of the trial, and the opposite seems to be true. If anything, that should have favored the RSI group, leaving more neurologically intact patients as part of the trial cohort.

The blood pressure in RSI group was not statistically significantly higher, although it was higher, and whether that reflects the low amount of midazolam used as part of the trial and some sort of adverse reaction by the patient is not certain. That has been one of the criticisms, and that was based on concern for hypotension caused by midazolam, which was shown in a previous study using heir medical data.

I think one of the most important questions has to do with the terminology and the issue of "hyperventilation" as a term versus "hypocapnia" and the possibility that these are really just surrogates for some other injury pattern in these patients that led the medics to ventilate them faster or with deeper tidal volumes. There is increasing data suggesting that ventilation strategies may play an important role, especially early in the course of a resuscitation, and that includes the release of cytokines and apoptosis of endothelial cells. Thus, I think this is an area that needs further research.

As far as what you would tell your paramedic

# Headaches

Elwood Hopkins, MD

## ABSTRACT

The challenge of sorting out the benign from the not-so-benign causes for headache is a common one on a daily basis in a busy clinic. Although the vast majority of otherwise healthy, young military members will have a benign source for their headaches (e.g., migraine or tension-type), the astute clinician must always be able to rely on the history and physical exam to make the distinctions, formulate a treatment plan, and make the appropriate recommendation regarding duty status of the active duty member.

In this paper, we will review the common and some of the less-common headaches that may be seen in the forward deployed arena. Being able to rely mostly on history, with supporting significant negative or positive physical exam findings, the clinician should be able to confidently render a diagnosis and treatment plan, understanding that the usual capabilities of an MTF will not be available.

Maintaining force readiness, keeping the war fighter's boots safely on the ground and knowing when to remove the member from harm's way are essential goals that all fighting units expect of their medical support teams.

## OBJECTIVES

1. With this information, the reader should be able to distinguish between benign and life-threatening causes for headache.
2. The reader should be able to define the characteristic symptoms of migraine headache.
3. The reader should be able to determine when a headache patient must be medically evacuated to the tertiary care center.

**CME/CNE**: This activity has been planned and implemented in accordance with the essential areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through joint sponsorship of USUHS and the Journal of Special Operations Medicine. USUHS is accredited by the ACCME to provide continuing medical education for physicians. USUHS designates completion of this article and test **.5 CME**. Nurses must complete **(both)** continuing education offerings to recieve **1.6** Countinuing Nursing Education Contact Hours**.** Test questions are on page 64. Please complete the answer sheet on page 67 and mail or fax it to us.

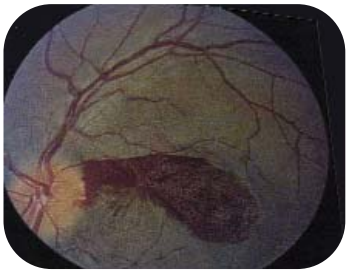
**FINANCIAL DISCLOSURE:** The author reported that their presentation will include discussion of commercial products and/or services. However, within the last two years, they have had no significant financial relationship with a commercial entity whose products/services are related to the subject matter of the topic they will be addressing or a commercial supporter of this educational activity.



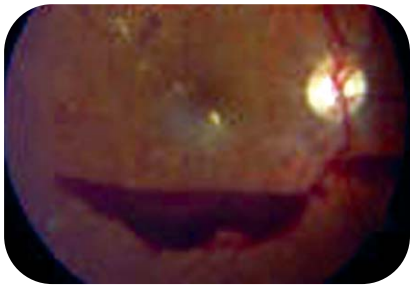
Headache is so common that many neurologists consider it a normal part of "the human condition." Although the vast majority of headaches are benign and self-limiting, it is crucial to identify those that are not benign. To delay or misdiagnose a subarachnoid hemorrhage or meningitis can mean the difference between life and death.

Although the "sound of hoofbeats" usually signals the arrival of horses, there are enough zebras out there to keep the clinician ever-mindful of the uncommon and life-threatening etiologies for headaches. As always, the best approach to a patient's complaint begins with construction of a broad differential diagnostic list, never forgetting the most serious (albeit less likely) causes.

Let's look at the headache causes that you never want to miss and how to approach them. In the young adult population, subarachnoid hemorrhage (SAH) from spontaneous rupture of an intracranial saccular (berry) aneurysm presents typically as a "sudden explosion in my head" type of headache. SAH may or may not be localized, associated with changes in mental status, or show focal neurologic signs.[1] If the patient is awake, meningeal irritation signs should be present. Look for unilateral pupillary dilatation with sluggish or absent response to light, indicative of compression of the third cranial nerve (very common with aneurysms involving the Circle of Willis). If you can get a look inside the eyes, you may see a "subhyaloid" or "preretinal" hemorrhage, which will appear as a pool of dark blood with a horizontal meniscus (line) along the superior edge (proof positive of bleeding in the subarachnoid space). If a computed tomography (CT) scan is available, this will detect most SAHs, but smaller bleeds may be missed by CT. If CT cannot be done, and if the patient has no localizing neurologic signs, and no subhyaloid hemorrhage is seen, or if the CT is negative, then examination of the cerebrospinal fluid (CSF) is the definitive test for SAH. The lumbar puncture (LP) will show elevated pressure and the CSF will be pink or blood-tinged, depending upon the amount of bleeding that has occurred. If you aren't sure if the blood might be from a traumatic LP, then centrifuge the CSF. If the blood is from trauma of the LP, the supernatant will be clear. On the other hand, if the blood originated in the subarachnoid space, the supernatant will be pink from breakdown of the red blood cells within the subarachnoid spaces. Once you have made a diagnosis of SAH, there is little more you can do except get the patient to your nearest neurosurgeon. If you have nimodipine, start the patient on this as it may reduce the cerebral vasospasm that follows SAH – this vasospasm contributes to morbidity and mortality by causing strokes. The only other thing you can do for these patients is provide comfort measures and cautious control of elevated blood pressures. About one third of patients with SAH will not survive the initial hemorrhage but fully another third can be brought to neurosurgical care with a successful outcome. Those that survive the initial hemorrhage are at increased risk for re-bleed, with even worse outcomes, so early identification and transfer to neurosurgery is essential.



Subhyaloid hemorrhage



In contrast to SAH, the patient with meningitis presents with a more gradual headache, usually generalized, with meningeal irritation, general malaise and flu-like symptoms, with or without fever.[2] There will be no focal neurologic symptoms or signs and LP must be done to make the diagnosis. In the case of bacterial meningitis, the cerebrospinal fluid (CSF) will be purulent, leukocytes will be mostly polymorphonuclear, the CSF glucose will be low (compared to simultaneous serum glucose) and the protein elevated. Start broad-spectrum antibiotics as soon as bacterial meningitis becomes a reasonable suspicion – do not wait for LP results, and do not delay for a CT or other diagnostic procedures. The standard of care demands early antibiotics, and the possibility of "sterilizing" the CSF prior to LP, thus skewing lab results, is unlikely and of little clinical concern. Transfer bacterial meningitis patients to a high level of care as soon as possible.

Viral meningitis, on the other hand, will show clear, colorless CSF containing predominantly mononuclear WBCs, normal glucose, only slight protein elevation (if any), and no organisms on Gram stain.[3] These patients should be placed on acyclovir pending results of polymerase chain reaction (PCR) testing for Herpes simplex virus and considered for CASEVAC to a tertiary care facility.[4]

Encephalitis and brain abscess patients will have altered mental status. They may have focal neurologic signs, increased intracranial pressure, and seizures. In the field, start these patients on broad-spectrum antibiotics, plus acyclovir, and arrange for CASEVAC as soon as possible![5]

Although many patients with headaches fear a brain tumor, headache as the only symptom is the exception in the case of brain tumors.[6] Brain tumors almost always cause other symptoms and signs, such as altered cognition, focal deficits, visual field impairments, speech difficulties, seizures, etc. If headache is the only symptom and if the neurologic exam is normal, you can be pretty confident that the patient does not have a brain tumor and does not need a CT or magnetic resonance imaging (MRI) scan.

Benign intracranial hypertension (BIH), or "pseudotumor cerebri," despite the title, is not necessarily a benign condition and, if untreated, can cause progressive and permanent visual loss.[7] These patients are almost always young, overweight women with a history of menstrual irregularities. They present with constant, generalized headache and usually no other symptoms. It is essential to get a good look at the optic fundi (dilate the pupils if necessary), which invariably reveal chronic papilledema, usually without hemorrhages or exudates. These patients should have a CT scan to exclude the presence of obstructive hydrocephalus. The CT will be normal or may reveal small, "slit-like" ventricles. LP is done both to confirm the diagnosis (pressure will be almost always greater than 200mm Hg) and as a therapeutic trial (headache will temporarily go away following LP). The cause for BIH is unclear, although some cases are associated with use of tetracycline derivatives, iron deficiency anemia, hypervitaminosis-D, and withdrawal from corticosteroid medication treatments. These patients should have formal visual field examinations and are best treated with acetazolamide (Diamox®) and weight reduction. Acetazolamide should be continued long-term (at least six months), as many of these cases relapse. Follow both their headache symptoms and visual fields at least every six months.

Inflammatory diseases such as vasculitis and arteritis may present like chronic meningitis and are hard to sort out without specialized examinations (sometimes to include brain and meningeal biopsies).[8] Fortunately, these are rare. This might be the patient who fails to respond to your various treatments for benign headaches and about whom your comfort level is beginning to fade. This is a good time to refer to higher level care.

Another difficult-to-diagnose and serious cause for headache is cerebral vein thrombosis.[9] These patients are usually women, often on hormonal therapy, who may have had recent or recurrent sinus infections, or who have coagulation disorders or miscarriages. They present with lateralized headache and a TIA or stroke-like picture. Although sometimes these can be diagnosed with CT (with contrast), often MRI with venography is needed. Treatment is with anticoagulants, clearly something you don't want to handle in the field.

Now, for the vast majority of headache patients you will see, let's get comfortable with firstly reassuring them (and yourself) that they don't have a malignant disease and that there are things you can do to help them and return them to duty.

Migraine is surely going to be the cause for most of the headache patients coming to you for treatment.[10,11] At least 18 percent of women and six percent of men suffer from recurrent migraines. Frequently they have been misdiagnosed as "sinus headache," which in fact is quite rare and occurs only in the setting of obvious, purulent infection of the sinuses in a patient who is "toxic," usually febrile, with exquisite sinus tenderness, postural headache symptoms, and sinuses that don't transilluminate, in addition to being opacified on sinus-x-rays.

Migraine begins in either the frontotemporal or occipital region, unilaterally, and then may become generalized, evolving over hours. The pain is throbbing, usually with hypersensitivity to light (photophobia) and noise (hyperacusis), nausea, and sometimes vomiting. The patient learns to lie in a dark quiet room for relief. Digital pressure on the temples and application of cold or ice may bring temporary relief. Migraines may occur cyclically, often associated with hormonal changes, sleep or food deprivation, dehydration, stress, and fatigue. They are self-limiting, usually remitting within a matter of hours and rarely continue for more than a day at a time. Some patients are able to identify "triggers" for their migraines, such as monosodium glutamate, diet drinks containing aspartame, chocolate, tomatoes, etc. About 15-20 percent of patients with migraine will have an aura, usually visual, involving half of the visual field, with bright flashing lights, lightning bolts, and zig-zag patterns that may gradually grow in size and obscure part of the vision, lasting about 20 minutes, followed by headache, contralateral to the visual aura. In some patients, the headache will be accompanied by a gradual spreading numbness of the tongue, face, hand, and even the leg. Speech difficulty and confusion may occur, mimicking a stroke or TIA. The evolution of these focal symptoms is much slower than in the case of stroke or TIA and always resolves fully.

If you examine the patient during the midst of their migraine, they will be obviously photophobic, clearly uncomfortable, and moving slowly. Compression of their temporal arteries may provide temporary relief, as will the application of something cold (like a tuning fork) to their temple. The exam will otherwise be unremarkable.

Migraines may be aborted acutely with the use of ergotamine (Cafergot®) or dihydroergotamine (DHE-45), or any of the new group of "triptan" medications (sumatriptan being the first on the market). These agents should not be given to patients with known hypertensive cardiovascular disease because of their potent vasoconstrictor properties. Alternatively, intramuscular ketoralac (Toradol®) or prochlorperazine (Compazine®), intravenous valproic acid (Depakane®) or metoclopramide (Reglan®) can be effective migraine abortants. Narcotics should be avoided as they are less specific and may just add to the nausea of migraine. Most acute migraineurs are dehydrated from nausea and vomiting, and deserve a fluid challenge of 500 milliliters to a liter of saline intravenously.

For individuals whose migraines occur only once or twice a month, acute medications are probably the best management strategy, in addition to life style changes (attention to diet, sleep hygiene, stress reduction, etc). Headaches that occur more often are best treated with prophylactic agents. Here, beta-blockers, calcium-channel blockers, low-dose tricyclic amines (amitriptyline, nortriptyline), and anti-epileptic drugs can be very effective.

Avoid the tendency to treat migraines with analgesics as this often leads to the development of "analgesic rebound" headaches that frequently transform into chronic daily headaches and are very difficult to treat. Both acetaminophen and aspirin can cause rebound headache.

Tension-type or muscle-contraction headaches may occur as part of the migraine complex, but may also occur separately.[12] These are chronic, lasting days or weeks at a time, originating in the sub-occipital regions, becoming "bandlike" and encircling the head, without light or noise sensitivity, nausea, or vomiting. The neck muscles will be tight and tender. Pain may be relieved with gentle massage as well as by ice or heat. Low-dose amitriptyline is probably the best medication for this headache, although sometimes physical therapy, exercise, and stress-management are best in the long-run.

Cluster headache occurs almost exclusively in men, typically awakening the patient from sleep with an intense unilateral pain, rhinorrhea, and lacrimation. The pains are often brief but may recur several times a night, eventually also occurring in the day as well. These clusters may continue for several days or weeks, then spontaneously cease, only to return usually around the same season each subsequent year. The pain never shifts sides, in contrast to migraine. Unlike the patient with migraine, the cluster patient can't lie still, paces about, grabbing at his head, sometimes pounding it with his fist in a futile effort to seek relief. On exam, a Horner's syndrome (slight ptosis and pupillary constriction) is often present on the side of the pain and the patient may have coarse "lionized" features and pitted ("peau d'orange") facial skin. Rapid relief can be provided with oxygen inhalation. Corticosteroids, verapamil, and lithium carbonate are effective in controlling these headaches and should be continued until such time that the normal course of the cluster is expected to end, reserving them for reuse when the clusters return the next season.

Hemicranial cephalagia, like the name implies, is a chronic, daily, unilateral headache, mostly seen in men, but without the other features associated with cluster headaches. This headache typically responds only to indomethacin.

Probably the easiest diagnosis to make is trigeminal neuralgia, or *tic douloureux*, a sudden, electric shock-like pain in one or more of the branch distributions of the trigeminal nerve.[13] These patients are in misery and will avoid any stimulation to the area of the face where the pain may be triggered. Shaving, brushing the teeth, eating, and drinking may be too painful for the patient to endure. The pain is brief, but occurs several times in the day and night. Initially only narcotics will help. Some of these can be controlled with anticonvulsants but eventually most of these come to neurosurgical attention for relief. You should be aware that trigeminal neuralgia in a young person is often a manifestation of multiple sclerosis.

Most of the headache patients you will see can be helped with simple measures and are often relieved just to learn that they don't have a brain tumor. When in doubt, call your friendly neurologist for guidance.

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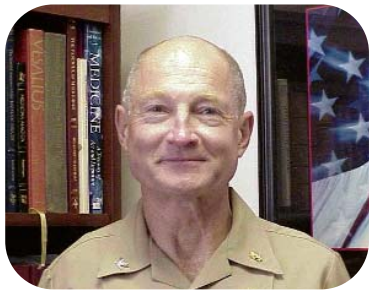
**Antibiotic Recommendations**

**For bacterial meningitis** – ceftriaxone 2g IV or IM q12h for 14 days; vancomycin 500mg IV q6h for 14 days; dexamethasone 10mg IV q6h for 4 days (note that recent evidence supports adding corticosterods to the treatment.)
**For brain abscess** – add metronidazole (for anaerobes & parasites) to the above. Load with 1g IV over 1h, then 500mg IV q6h for 10 days.
**For viral encephalitis (presumed Herpes simplex)** – acyclovir 10mg/kg IV q8h for 14 to 21 days.



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His first tour of active duty was Berry Plan - Naval Regional Medical Center Oakland. He spent 14 years in private practice in San Francisco and Berkeley, CA. He was a visiting staff consultant for the VA Hospital Martinez and Merced Community Medical Center- UC Davis. He was with the NAS Alameda as a reservist until his return to active duty at which time he went to Flight Surgery School.

His background includes; Department Head of Internal Medicine and Neurology, NAMI Lecturer to DMOs at NDSTC, Panama City, Senior Medical Officer USS JF KENNEDY (CV 67), Staff Neurologist Naval Medical Center San Diego (NMCSD), and Senior Medical Officer U.S. Naval Academy. He has now returned to NMCSD.

# Introduction of Functional Physical Training into Special Operations Units

Glenn Mercer, HMCS (SEAL)
Michael Strock, MS, ATC, CSCS

**ABSTRACT**

In October 2002, Naval Special Warfare Combatant Craft Crewman were anecdotally reporting unusually high injury rates associated with piloting high speed boats. The Naval Special Warfare Group FOUR Human Performance Department was designated as the Executive Agent for tracking the rate and etiology of subject injuries. Subsequent two year data analysis demonstrated conventional physical training (PT) was the primary source of both acute and chronic injuries

This article discusses the primary aspects of statistical analysis, program modification, implementation, and the use of demand analysis to design physical training program architecture. Professional strength and conditioning vetting is presented as a primary tenet of program success and means for changing longstanding corporate military climates that prevent medical end source data being used as a source for change. A single Echelon IV command is presented as the analogous model for the readers' comparisons.



Over the last 20 years, Special Forces has experienced exponential growth in technology, employment, and mission essential core tasks. The Global War on Terrorism (GWOT) and its subsequent demand for increased force availability to the theater combatant commanders has accelerated this growth. One of the preeminent problems has been force sustainment, as USSOCOM assets enter their third year as a primary direct action element in the prosecution of the GWOT.

Manpower loss from non-occupational circumstances is degrading both real-time combat readiness and long-term retention. In the last 18 months an Echelon III Special Forces Command analysis found a significant injury rate related to two factors. These are the concurrent long-term execution of conventional physical training and standard Special Forces core tasks.

One of the Special Forces core tasks involves the use of high speed craft (HSC) during water operations. The current master program to deal with deceleration dynamics of HSC is known as shock mitigation. This is a major research program at the USSOCOM and Naval Health Research Center (NHRC).[1] These programs deal with the mechanical reduction of shock and deceleration caused by the craft but do not address the requisite anatomical preparations or fitness levels to achieve competent injury free operations.

The study group was the 700 member Naval Special Warfare Combatant Craft Crewman (SWCC) community which operates high-speed maritime platforms in austere environments. Prior to the study a conventional wisdom assumption held that operation of these craft was causing both acute and chronic injuries at an exceptionally high rate. These assumptions, based upon anecdotes, were never substantiated objectively.

Previous to the Echelon III study, a precursor data analysis was done at Special Boat Team TWENTY on 18 months of acute medical complaints.[2] These demonstrated that in the acute care venue, the actual underway rate of injury was relatively low. The objective data demonstrated that running and

*Conventional physical training is a major cause of acute and chronic injury in the combatant craft crewman.*

intramural sports-related injuries were more common than from piloting the HSC. Chronic injuries were not addressed.

This situation prompted the NSWG4 Echelon III term study to further establish the proper talking points for SWCC injury environments. Due to the overwhelming data conclusions from the acute care quick look, they decided to focus in-depth tracking on the chronic complaints that are processed in the Group rehabilitation facilities.

As the real-time study progressed it became evident that the genesis of qualified chronic complaints was the command physical training program, as opposed to industrial injury from piloting HSC. This was further substantiated when 36-months of data collection that included over 5000 rehabilitation visits were examined for causative activity. They realized that in all aspects of morbidity reporting conventional physical training was identified as the primary cause of rehabilitation referrals and direct complaints.

This split into two distinct environments. While neither study was scientific due to lack of formal cohorts and control groups, the common sense assessment supported a direct correlation between chronic injury and physical training.

This brought about several study sequels in the pursuit of establishing the definitive cause of SWCC injury. Based on the documented chief complaint of over 7000 medical encounters, across all the clinical service environments, the following hypothesis and supporting tenets were developed.

-Physical conditioning is the most critical pillar of shock mitigation.
-SWCC operators must physically train to resist the effects of repetitive deceleration G forces on multiple axes.
-The primary operational career ending circumstance for SWCC operators is chronic versus acute injury.

Our response to the injury studies and effects of conventional physical training was the development of "performance training." In support of this hypothesis the following standard operating tenets were developed by our Human Performance Department.

1. Conventional SOF physical training techniques are contributory to long-term chronic injury when coupled with high demand SOF work environments.
2. Conventional SOF physical training techniques cause cumulative anatomical imbalances that have progressively detrimental effects over the length of a career.
3. Physical training must be monitored, assessed, developed, and terminally guided with the same due diligence that is used with SOF combat systems.
4. Physical training must be vetted and screened for effectiveness using the following prioritized criteria:
    a. Use of demand analysis
    b. Core conditioning and functional application in multiple planes of motion[3]
    c. Use of adaptive theory and overload principles[4]
    d. Development of anaerobic capacity
    e. Development of strength coupled with rapid neuro-muscular response[5]
    f. Definitive scheduling of career and deployment meso-cycles
5. Adequate rest and regeneration techniques must be planned as part of the end state. This includes nutritional development and counseling.
6. A defined minimum number of hours per week must be dedicated to high intensity physical training.

In March of 2003, NSWG Human Performance Staff began the design architecture for a physical training program that was state of the art in content, application, and measured end state. The following is a short form narrative of the developmental process.

### Task Organization

It was initially determined that two basic tenets to the program were critical for success.

- Human Performance must have endorsed line authority to execute the components of the plan.
- Human Performance departments and rehabilitation divisions must have an injury prevention mission statement that has proactive components.

### Vetting

Initial and continual vetting is a fundamental piece of program design. The hallmark of Special Forces organization is the professional conduct with which the periodic tasks are accomplished. There is a common thread between professional athletes and professional SOF operators: the investment of millions of dollars. Distributed training and operational funds over a career are analogous with the salary investments made with the short spectrum life of professional athletes; therefore, primary vetting for this program was done with strength and conditioning coaches of professional sports.

### Program Inception

A single 11 Meter Rigid Hull Inflatable Boat Detachment was chosen to participate in the training program based on the tenets mentioned earlier. The eight member detachment had an age range of 20 to 38. A medical history and evaluation was completed prior to participation in the training program. They completed a four month meso-training cycle separate from the other SWCC operators and were under the supervision of the Human Performance department. The program was tailored to the individuals of the detachment based on medical history and current fitness level. Progressions were individualized and metered. We found the motivation level high and, more importantly, we had a zero percent injury rate during their training.

This proof of concept delivered exceptional term results and served as a factual demonstration that the program was conducive and complimentary to their daily core training cycle. Qualified and quantified testing was done at inception and discharge that validated the program beyond anecdotal and narrative critiques to line commanders.

### Continuing Operations

The command-based program was subsequently implemented in December of 2003 with a six month phased program becoming the final macro cycle. This continues to a real time density of forty trained athletes on a daily basis. Further refinements are added on an ongoing basis as developments in physiology and strength research emerge.

The following sections detail the process of demand analysis and program specifics that are key and essential to the design architecture for physical training within Special Operations units.

### Demand Analysis Case Study

Let us examine two of the most commonly used military physical training exercises: pushups from the strength spectrum and running for distance or time from the aerobic spectrum. If we apply the basic human performance operating tenets, we can quickly develop a common sense assessment that neither application meets the basic "litmus test."

In the instance of pushups we have a simple, single plane exercise that primarily taxes the triceps, anterior deltoids, and pectoralis. In most circum-

stances the exercise is performed in light PT gear for a "sets and repetitions" end state.

If you examine the physical demands and movement patterns within your units, you would be hard pressed to find a motion with similar kinematics. We have never found a movement pattern or skill set that placed the operator in a prone position with a locked lower torso that *required* the repetitive flexing and extension of the shoulder complex over a linear 10 inch distance. Furthermore, the routine lack of an anatomical load or anything resembling ground forces combat kit while doing the exercise makes the primary use of this exercise difficult to justify. There are several examples of single repetition explosive ground movements within SOF; however, it is a rarity to see an anatomically loaded plyometric movement being used in the conventional PT circle.

Using the twofold demand analysis we find an unusually high rate of incidence with shoulder injuries that involve the acromio-clavicular joint and tendonopathy in our NAVSOF operators. While not scientifically valid, the common sense conclusions are difficult to ignore.

This demand analysis is not drafted to eliminate pushups from the military lifestyle but to simply demonstrate how quickly even the most basic movement pattern we have all done over a lifetime of military service can be deceiving. The first cousin of pushups is the bench press. We have found that it is another grossly ineffective variant of the pushup but with much greater connective tissue risk to the operator.

Pressing movements are not bad; they are simply a very ineffective exercise with low functional value in a state of the art physical conditioning plan. We have found that there are some substantial uses for the pushup but they are limited to the elasticity, stability, and plyometric-rapid response environment.

Which brings us to a simple end state that pushups prepare the operator to do more pushups. It is truly a management of the masses exercise that has an inherent ceiling for rapid numbers improvement. In many cases, SOF operators have routinely completed 100,000 pushups by the time they reach a 20 year point in their career, a truly astounding amount of application time if you consider that the exercise exists in the "least effective" category.

Running for time and distance in light PT gear reaches the same least effective description when examined. This event does pass the demand analysis test; however, it quickly falls apart when you examine the baseline applied environment. The reader is invited to use the described human performance operating tenets to reach their own conclusions for this case study.

**PROGRAM SPECIFICS**

Prior to commencement each operator goes through an arthrokinetic assessment. This identifies posture and alignment dysfunction. Optimum posture and alignment provides structural and functional efficiency to the kinetic chain. If one component is out of alignment it can lead to a predictable pattern of tissue stress and dysfunction. This produces inefficiency in movement and can lead to chronic overuse syndromes.[6] Each member is taken through the Reebok Functional Movement Screen™ which is designed to assess mobility and stability with a simple grading system that will: 1) help focus the orthopedic exam with respect to functional movement limitations; 2) create specific criteria for exercise prescription; 3) help identify underlying problems due to imbalances; and 4) serve as a base line of pre-injury function.[7]

Operators are given an exercise methodology briefing and indoctrination, reviewing the points of performance and terminology. Exercise progressions are based on the performance pyramid found on page 58.

The daily training sessions are broken down into four distinct components: movement preparation, core training, energy system development (ESD), and recovery.

Movement preparation is a state of the art replacement for the time wasting conventional static stretching routines. It is dynamic in nature and consists of flexibility exercises and postures that increase heart rate, blood flow, and activate the nervous system.[8] This component is the most significant change that directly correlates to the improved end state of performance training.

Core training is the high intensity strength component of the workout. There is shift away from the traditional lifting mindset. Traditionally, operators would train isolated muscle groups such as chest, biceps, and legs in a single plane of motion. We approach it from an integrated multi-joint, multi-plane environment. The strength exercises incorporate a flexibility and stabilization component as well. The points of performance are quality over quantity, progressions that are safe and aimed at success, intensity and variation over volume, and no injuries attributed to the training session.[9]

The third component of the training session is ESD.[10] The body utilizes three different energy sys-

tems: phosphagen system, glycolysis, and oxidative.[11] The phosphogen system provides a quick source of energy up to 12 seconds. The glycolysis system provides energy for high intensity work up to three minutes and the oxidative or aerobic system provides energy for work beyond three minutes. All three systems are intensively trained throughout the 60 minutes. We have found through demand analysis that extending the anaerobic threshold is the fundamental key to full spectrum improvement in mission performance for the operator.

ESD has several pillars that are departures from traditional SOF-based cardio training. Middle and long distance (> 4 to 6 miles) running are eliminated as the primary source of lung capacity development. In lieu of this, we use higher intensity activities from the anaerobic spectrum that eliminate the tremendous amount of career impact stress produced by aerobic running.

Each time the foot hits the ground, the force is equivalent to as much as seven times your body weight. This cumulative trauma over time can be detrimental, especially if poor running mechanics or anatomical imbalances are present. We like to use the analogy that it's like driving a car that is out of alignment for several thousand miles. Terminally, if it goes uncorrected, break down will occur.


The fourth component of the training session, recovery or regeneration, is often the most overlooked and hardest to take hold within the athlete population. Regeneration is geared to assist the body in its ability to recover from the environmental and training stresses placed on it. Active rest that stresses tissue recovery is a program requisite and is often misinterpreted by operators as complete inactivity. We have discovered that implementation of this has radically improved the intensity of subsequent training sessions.

At the point of article submission it is still not possible to prove that conventional physical training is the unilateral cause of exorbitantly high chronic complaints; however, it is substantiated that the local rate of complaint from both physical training and HSC operation has been sharply reduced from previous rates of incidence by implementing performance training as a replacement for conventional SOF physical training.

From an occupational medicine and preventive medicine perspective the success of the program can be gauged by several metrics:

1. The raw reduction in the "rate of incidence" of acute injuries across the board.
2. The specific reduction in injuries to the traditionally chronic SOF anatomy (e.g., knee, lumbar spine, rotator cuff/AC joint).
3. The reduction in severity and onset delay of degenerative processes such as chondromalacia, patellar-femoral syndrome, degenerative joint, and non-specific low back pain.
4. Chronic complaints that are exacerbated from job specific activities will decrease proportionately with the length of time the operator is participating in performance training.

These indicators will serve as significant guiding statistics for the future adjustments and progressions of the program. This data coupled with the measured front end performance improvements will allow for the change in corporate PT climates that for years have been an unintentional source of long-term operator morbidity.

This applied human performance program is a significant piece of the overall shock mitigation strategy. As with conventional preventive medicine efforts, specific and focused physical conditioning will provide the combatant crewman with an increased likelihood of avoiding chronic and acute shock injury. Continued long-term data collection will be integral for complete validation.

It is desired that this article promotes significant changes in the conventional thinking within SOF units regarding the conduct and long term application of physical training. The emergence of professionally applied and vetted strength and conditioning within Special Operations is overdue. Conditioning is the one singular event that every operator will spend the most time doing throughout their careers. This cornerstone of an operator's preparation should be given the same due diligence that is reserved for our weapons, navigation, and communications systems. Implementing these changes within SOF units will ensure that operational commanders have a force with tailored, peak physical readiness at the right time and place for maximum effect on target.

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Michael Strock is a 1991 graduate of Salisbury University and received his Master's of Science degree at the University of Kentucky in 1993. He is the division head of Human Performance and Rehabilitation at NSWG4 in Norfolk, VA. He is a Certified Athletic Trainer and Strength and Conditioning Specialist (CSCS) through the National Strength and Conditioning Association. He has been with NSWG4 since 2001.

# Abstracts of Current Literature

## Predicted arterial oxygenation at commercial aircraft cabin altitudes

J. Michael Muhm
*Aviation, Space, and Environmental Medicine Oct 2004; 75:905-12*

**Introduction***:* The degree of hypoxia manifested by airline passengers during flight is not well characterized. Statistical models to predict age-specific levels of $PaO_2$ manifest at altitudes between sea level and 8000 ft ($PaO_2alt$) are described. **Methods***:* The relationship between age and $PaO_2$ at sea level ($PaO_2sl$) and the relationship between $PaO_2alt$, and $PaO_2sl$, $PCO_2$ at sea level ($PCO_2sl$), and pulmonary health status were investigated using linear regression techniques to analyze previously published data. **Results***:* In persons with normal pulmonary health, the relationship between $PaO_2sl$ (mmHg) and age (yr) was $PaO_2sl = 105.9 - 0.44 * age$ ($R^2 = 0.582$, MSE = 25.314); $PCO_2s1$ (38.1 $\pm$ 2.8 mmHg) was not related to age over the range 18-75 yr. In persons with chronic obstructive lung disease (COPD), neither $PaO_2sl$ (78.2 $\pm$ 11.3 mmHg) nor $PCO_2sl$ (40.5 $\pm$ 5.7 mmHg) were related to age (77.0 $\pm$ 9.0 yrs). The relationship between $PaO_2alt$ and $PaO_2sl$, $PCO_2sl$ and altitude (ft) was: $PaO_2alt = 1.59 + 0.98 * PaO_2sl + 0.0031 * Alt - 0.000061 * PaO_2sl * Alt - 0.000065 * PaO_2sl * Alt + 0.000000092 * Alt^2$ ($R^2 = 0.932$, MSE = 22.774). **Discussion***:* $PaO_2sl$ declines with age in persons with normal pulmonary health; $PCO_2sl$ remains constant. Neither vary with age in persons with COPD. $PaO_2alt$ can be estimated with acceptable precision from knowledge of $PaO_2sl$, $PCO_2sl$, and altitude. These models predict a substantial proportion of older passengers will manifest a $PaO_2alt$ at 8000 ft below the threshold at which supplemental oxygen is recommended.

## Building a Better Fluid for Emergency Resuscitation of Traumatic Brain Injury

Crookes, Bruce A. MD; Cohn, Stephen M. MD, FACS; Bonet, Harry MD; Burton, Elizabeth A. BA; Nelson, Jacob BS; Majetschak, Matthias MD; Varon, Albert J. MD; Linden, Joel M. PhD; Proctor, Kenneth G. PhD
*Journal of Trauma-Injury Infection & Critical Care. 57(3):547-554, September 2004.*

Hextend (HEX) is a colloid solution that is FDA-approved for volume expansion during surgery. ATL-146e is a novel adenosine $A_2A$ receptor agonist that has anti-inflammatory, neuroprotective, and coronary vasodilator properties. Three series of experiments were designed to evaluate the therapeutic potential of HEX+/-ATL-146e for emergency resuscitation from traumatic brain injury (TBI) + hemorrhagic hypotension. **Methods**: In the first two studies in vivo, anesthetized, ventilated pigs (30-45 kg) received a fluid percussion TBI, 45% arterial hemorrhage, and 30 minutes shock period. In Series 1, resuscitation consisted of unlimited crystalloid (n = 8) or HEX (n = 8) to correct systolic arterial pressure >100 mm Hg and heart rate <100 bpm for the first 60 minutes ("emergency phase"), and then maintain cerebral perfusion pressure (CPP) > 70 mm Hg for 60-240 minutes. In Series 2 (n = 31), resuscitation consisted of a 1L bolus of HEX + ATL-146e (10 ng/kg/min, n = 10) or HEX +placebo (n = 10) followed by crystalloid to the same endpoints. In Series 3 in vivo, the hemodynamic response evoked by 0, 10, 50, or 100 ng/kg/min ATL-146e was measured before or 60 minutes after HEX resuscitation from 45% hemorrhage. **Results**: Following TBI + hemorrhage, there were 4/22 deaths in series 1 and 11/31 deaths in Series 2. In those alive at 30 minutes, mean arterial pressure, cardiac index, mixed venous $O_2$ saturation, and cerebral venous $O_2$ saturation were all reduced by 40-60%, while heart rate and lactate were increased 2-5 fold. With no resuscitation (n = 2), there was minimal hemodynamic compensation

and progressive acidosis. Upon resuscitation, these values corrected but intracranial pressure progressively rose from <5 mm Hg to 15-20 mm Hg. Series 1: With HEX (n = 8) versus crystalloid (n = 8), CPP was less labile, acid/base was maintained, and the fluid requirement was reduced by 60% (all $p < 0.05$) Series 2: With ATL-146e (n = 10) versus placebo (n = 10), stroke volume and cardiac output were improved by 40-60%, and the fluid requirement was reduced by 30% (all $p < 0.05$). Series 3: ATL-146e caused a dose-related increase ($p < 0.05$) in stroke volume after, but not before, hemorrhage. The effects on pre-load, afterload, and heart rate were similar before and after hemorrhage. **Conclusions**: HEX alone is a safe and efficacious low volume alternative to initial crystalloid resuscitation after TBI. An adenosine $A_2A$ agonist combined with 1 L of HEX safely and effectively counteracted a decrease in cardiac performance noted after TBI+hemorrhage without causing hypotension or bradycardia.

## Application of a Granular Mineral-Based Hemostatic Agent (QuikClot) to Reduce Blood Loss After Grade V Liver Injury in Swine

Pusateri, Anthony E. PhD; Delgado, Angel V. MS; Dick, Edward J. Jr DVM; Martinez, Raul S.; Holcomb, John B. MD; Ryan, Kathy L. PhD
*Journal of Trauma-Injury Infection & Critical Care. 57(3):555-562, September 2004.*

**Background**: Uncontrolled hemorrhage is a leading cause of death in cases of trauma. Many products currently are under development to control traumatic bleeding. One such Food and Drug Administration (FDA)-approved product is QuikClot. This study determined the efficacy of QuikClot, a hemostatic agent, in reducing blood loss and mortality in a standardized model of severe liver injury as well as the consequences of its use. **Methods**: Swine received either QuikClot or gauze treatment after induction of grade V liver injuries. Hemostasis, blood loss, resuscitation volume, 60-minute survival, and peak tissue temperatures were measured. **Results**: Hemostasis was improved with QuikClot ($p < 0.05$), and resuscitation volume was consequently reduced ($p < 0.05$). Post treatment blood loss was reduced ($p < 0.01$) with QuikClot (1,397 mL), as compared with gauze (5,338 mL). The survival rate was seven of eight in the QuikClot group and one of eight in the gauze group ($p < 0.01$). Peak temperature at the tissue interface was increased ($p < 0.01$) with QuikClot (93.3 +/- 10.5[degrees]C), as compared with gauze (37.5 +/- 6.5[degrees]C). QuikClot use was associated with both macro- and microscopic tissue damage caused by the exothermic reaction. **Conclusion**: QuikClot provides hemostasis and decreased mortality in this model of severe liver injury. The beneficial aspects of QuikClot treatment must, however, be balanced against the tissue-damaging effects of the exothermic reaction.

## Treatment of Field Water with Sodium Hypochlorite for Surgical Irrigation

Cyr, Steven J. MD; Hensley, Donna; Benedetti, Gary E. MD
*Journal of Trauma-Injury Infection & Critical Care. 57(2):231-235, August 2004.*

**Background**: Early irrigation and surgical debridement of high-energy wounds and open fractures effectively prevents infection. Rapid wound care has been maximized by the United States military's "forward surgical teams." However, the volume of sterile irrigant required to treat multiple patients with multiple wounds presents a significant logistical burden. Using ground-derived field water could eliminate this burden. **Methods**: We collected 100 water samples from five sources. An initial bacterial count (CFU/mL) was determined before treatment. 5% sodium hypochlorite was then added to each sample to derive a concentration of 0.025%. After treatment, a final bacterial colony count was performed. **Results**: We found no bacterial growth in 99/100 samples. One post-treatment sample grew a single colony of a Bacillus species not present in the pretreatment culture and was determined to be an air contaminant. **Conclusions**: Our field-expedient modification of Dakin's solution could substitute for sterile irrigation fluid when it is neither available nor logistically feasible.

# CONTINUING MEDICAL EDUCATION TEST

## The Esophageal-Tracheal Combitube:

### A review of the device and its application in the SOF environment

**1 CME -- Nurses must complete both continuing educational offerings to recieve 1.6 CNE**

JSOM

1. The esophageal-tracheal Combitube® (ETC) is only effective in the esophageal position.
    a. True
    b. False

2. Correct placement of the esophageal-tracheal Combitube® (ETC) requires:
    a. Visualization of the vocal cords.
    b. Visualization of the esophagus.
    c. Access to the patients mouth.
    d. Access to the patient nasopharyngeal area.

3. How does the esophageal-tracheal Combitube® (ETC) ventilate while in the esophageal position?
    a. Indirectly through the 8 oval-shaped (7 x 3mm) perforations that are located at the level of the hypopharynx in the blue “1” tube.
    b. Directly through the end of the blue “1” tube.
    c. Directly through the end of the transparent “2” tube.
    d. Indirectly through the 8 oval-shaped (7 x 3mm) perforations that are located at the level of the hypopharynx in the transparent “2” tube.

4. How does the esophageal-tracheal Combitube® (ETC) ventilate while in the tracheal position?
    a. Indirectly through the 8 oval-shaped (7 x 3mm) perforations that are located at the level of the hypopharynx in the blue “1” tube.
    b. Directly through the end of the blue “1” tube.
    c. Directly through the end of the transparent “2” tube.
    d. Indirectly through the 8 oval-shaped (7 x 3mm) perforations that are located at the level of the hypopharynx in the transparent “2” tube.

5. Which is not a technique for confirming placement for the esophageal-tracheal Combitube® (ETC)?
    a.. End tidal $CO_2$ detector.
    b. Esophageal detector device.
    c. Increasing values on the pulse oximeter.
    d. Insertion to 22cm and inflation of the oral pharyngeal balloon.

6. Which of the following is a contraindication to the use of the esophageal-tracheal Combitube® (ETC)?
    a. Severe maxillofacial trauma.
    b. Complete airway obstruction.
    c. Presence of a known or suspected C-spine injury.
    d. Oral or nasal hemorrhage.

7. If occlusion of the glottic opening occurs during placement of the esophageal-tracheal Combitube® (ETC), which of the following is true?
    a. Ausculatory findings will be present on in the epigastrum.
    b. The device should be completely removed and another attempt at placement should be made.
    c. Forceful attempts at ventilation should be made in order to dislodge any possible obstruction.
    d. Both balloons should be deflated and the ETC should be pulled back 2-3 cm, then the balloons should be re-inflated and repeat verification of placement should be done.

8. Key patient populations which may benefit from the use of the esophageal-tracheal Combitube® (ETC) include which of the following:
    a. Patients in enclosed spaces where endotracheal intubation is not possible but airway control is necessary.
    b. Patients with severe caustic injuries to the oropharynx.
    c. Infants and small children less than 4 feet tall.
    d. Patients with an intact gag reflex.

9. Advantages to the SOF medical provider for the use of the esophageal-tracheal Combitube® (ETC) include which of the following:
    a. The ability to control the airway without the need to verify placement of the device.
    b. The ease of use of the device and its proven efficacy in the pre-hospital environment.
    c. There is no need for formal training as the device is fail-safe.
    d. SOF providers can keep the device in place for over 24 hours without the need for replacement.

10. Which of the following trauma patients would benefit from the use of the esophageal-tracheal Combitube® (ETC)?
    a. A patients with a known upper airway obstruction due to massive tissue destruction.
    b. A patient who with a severe head injury who is posturing and jaw clenching.
    c. A trauma patient with oropharyngeal bleeding who cannot be intubated via traditional direct laryngoscopy and endotracheal intubation.
    d. A patient who is severely hemorrhaging and in shock but able to communicate.

# CONTINUING MEDICAL EDUCATION TEST

## Headaches

**.5 CME -- Nurses must complete both continuing educational offerings to recieve 1.6 CNE**

JSOM

1. The definitive test for subarachnoid hemorrhage is:
    a. CT scan.
    b. CSF exam.
    c. careful history and physical examination.
    d. cranial nerve examination.

2. Compression of the 3rd Cranial Nerve causes:
    a. pupillary constriction.
    b. pupillary dilatation.
    c. facial weakness.
    d. seizures.

3. In the absence of signs of increased intracranial pressure or focal neurologic deficits, a lumbar puncture is appropriate to rule out meningitis.
    a. True
    b. False

4. How can you distinguish if bloody spinal fluid is from a traumatic tap or from a subarachnoid hemorrhage?
    a. by centrifuging the CSF.
    b. by the RBC:WBC ratio in the CSF.
    c. you can't.

5. CSF that is cloudy, has predominantly polymorphonuclear leukocytes, low glucose and elevated protein is presumptive evidence of:
    a. bacterial meningitis
    b. viral meningitis
    c. both

6. Finding the above CSF in a patient with headache, you should treat with:
    a. broad-spectrum antibiotics.
    b. Acyclovir.
    c. neither; wait for the culture results.

7. A 22 year old man with six months of episodic headache, occurring once or twice a month, with nausea, sensitivity to light and noise, lasting a few hours and relieved after a nap, most likely has a:
    a. brain tumor.
    b. cluster headache.
    c. migraines.
    d. tension-type headache.

8. The above patient should:
    a. be sent for a CT scan.
    b. be reassured and treated with prn Cafergot®.
    c. started on indomethacin.

9. Migraine is best managed by giving patients prn Tylenol # 3 and ibuprofen.
    a. True
    b. False

10. A 19 year old overweight women with six weeks of generalized headache and no other symptoms presents in your clinic. To make the correct diagnosis you should:
    a. use an ophthalmoscope.
    b. send for a CT.
    c. give her a trial of Elavil and have her come back in a month.

**Continuing Education Evaluation Form**
**Journal of Special Operations Medicine, Volume 5, Edition 1 / Winter 05**

**Date of original release**: 1 Mar 05
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**The Esophageal -Tracheal Combitube A review of the device and its application in the SOF environment - Page 29**
Bob W. Hesse, RN, NREMT-P, I/C; Troy R. Johnson, MD;
Dan S. Mosely, MD; Andre M. Pennardt, MD

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**Continuing Education Evaluation Form**
**Journal of Special Operations Medicine**
**Volume 5, Edition 1 / Winter 05**
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**Headache - Page 49**

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| 1. | a b c d | 6. | a b c |
| 2. | a b c d | 7. | a b c d |
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| 4. | a b c | 9. | a b |
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| | **The Esophageal -Tracheal Combitube Page 29** | | **Headache Page 49** | |
|---|---|---|---|---|
| | Strongly Agree | Strongly Disagree | Strongly Agree | Strongly Disagree |
| **Educational Value**: | 5 4 3 2 1 | | 5 4 3 2 1 | |
| I learned something new that is important. | _ _ _ _ _ | | _ _ _ _ _ | |
| I verified some important information. | _ _ _ _ _ | | _ _ _ _ _ | |
| I plan to discuss this information with colleagues. | _ _ _ _ _ | | _ _ _ _ _ | |
| **Readability Feedback:** | | | | |
| I understood what the authors were trying to say. | _ _ _ _ _ | | _ _ _ _ _ | |
| Overall, the presentation of the article enhanced my ability to read and understand it. | _ _ _ _ _ | | _ _ _ _ _ | |
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Current Events

# Special Forces clinic treats Afghan

Sgt Frank Magni
17th Public Affairs Detachment

Konar Province, Afghanistan – For many in Afghanistan, access to proper medical care is very limited. A lack of medical training and equipment within community clinics has prompted Coalition forces to send their own medical personnel into communities to assist.

But in Konar Province, medical civilian aid projects are also being supplemented with an unconventional approach. The same clinic that treats Coalition forces at this Special Forces A-camp leaves its doors open for Afghan citizens as well.

The clinic — made up of a doctor, Special Forces medics, Navy and Marine corpsmen, and interpreters — treats more than 100 patients a day. Open five days a week for sick call, the medics also stay on call around the clock for emergency care, either for military members or Afghans.

The rise in the clinic's popularity is simple, said the Special Forces medical sergeant in charge of the clinic assigned to the Combined Joint Special Operations Task Force Afghanistan. "We are the most definitive care facility is the area. We are much better supplied and much better trained than any clinic within hundreds of miles."

Konar Province, like many areas in Afghanistan, lacks the level of medical care many are accustomed to throughout the world. With the nearest equivalent medical care facilities in the neighboring country of Pakistan, a combination of crumbling roads, unpredictable weather, and a high crime rate make a journey to see a doctor a large undertaking.

"If a family had the means, it would take them one day of travel to see a doctor," said the Special Forces medic.

With poverty still rampant in the area, injuries often go untreated, contributing to a high mortality rate prior to the clinic operation.

Able to handle everything from gunshot wounds and burns to motor vehicle and mine accidents, the Special Forces medic said he and his team has seen a wide variety of injuries and diseases in their nine months in Afghanistan. "Everything in the book," he said.

"Whether it is an arm or leg that's blown off, or passing out soap and tooth brushes, we don't have the luxury of practicing just one kind of medicine," said the clinic's doctor and the CJSOTF-A surgeon here.

Averaging two trauma cases a week, the clinic's team even has the ability to call in medical evacuation helicopters for more serious cases involving life, limb, and loss of eyesight.

Malaria, upper respiratory infections, rare genetic disorders, liver disease, and burns round out the laundry list of conditions the medical personnel in the clinic have encountered — burns being one of the more common injuries the Special Forces team has seen in the prominently agricultural area.

"I've had at least 40 to 50 burn patients in my nine months (here)," said the Special Forces medic. "Many of these cases would require in-patient care in the United States."

Without skin grafts, burn patients return to

the clinic every few days to have infected areas treated and bandages changed, and even with the less advanced treatment, the Special Forces medic said proudly said he has only lost one patient who was beyond being saved.

He said he knows there are people in the community who still ignore their services because of the lack trust in Coalition forces — something he tries to change with every new face in the clinic.

"They are very stern in presentation and are not vocally gracious and thankful," said the Special Forces medic. "It's also very difficult to gain their trust. This is because we are different, but not in a bad way."

His secret in building relationships doesn't come from his experience as a Special Forces medic or Soldier, but as a father.

"I use family pictures and stories," he said. "I portray myself as a family man. … If we don't have anything else in common, we both love and take care of our families. I think everyone can understand this."

Breaching the cultural gap at the personal level, the Special Forces medic said he has built long-lasting relationships with repeat Afghan patients. To the point where many patients use his first name and even bring him gifts.

Aside from the success of the clinic, the medics also take part in medical capability exercises throughout the Konar Province. These MEDCAPs, keeping a focus on treatment, also allow the medics and corpsmen to do other things.

"When we go out on MEDCAPs, we also try to focus on distributing medical supplies to the local care providers along with training," said the Special Forces medic. Some of the local care providers have even come to the clinic to obtain training to take back into their communities.

During his time here, he said the Combined Joint Special Operations Task Force – Afghanistan has provided medical equipment, generators, medical supplies, and improved medical buildings throughout the province.

The Special Forces medic estimates he and his team have treated several thousand patients in nine months. He admits that progress has sometimes been slow, but he points to a few indicators that show more people trust the Coalition as an extension of the central government.

First, he has seen the number of women coming to the clinic rise exponentially. "Women would rarely come to the clinic when I first got here," said the Special Forces medic. "Now, they make up close to ten percent of the people we treat."

Haje Sharin, father of Wahida Maslim, said after his daughter was treated at the clinic, "Right now I feel like I'm in America, I'm so happy."

The Special Forces medic said it's feedback like this that keeps him going.

"I feel like without my intervention on a few occasions, people would have died," he said. "That and the thank you at the end make it all worth it."

## Soldier's Medal honors USSOCOM Army captain for selflessness

Jennifer Whittle, USSOCOM Public Affairs

The explosions were terrifying and his initial instinct was to flee from the scene — until he heard there were wounded Soldiers. What kicked in after that was his courage under fire.

Army CPT John Paul, U.S. Special Operations Command, earned the Soldier's Medal for his actions that day last year in Iraq and was pinned with the award at the USSOCOM Headquarters by BGen George Flynn, Chief of Staff, in November.

Paul, a physician's assistant who treats patients daily at the USSOCOM clinic, MacDill Air Force Base, FL, had recently arrived in Iraq for a year tour. May 7, 2003, took him a little by surprise.

"It began with a rocket being fired at our base in Tikrit," Paul said. "As a result, several hundred rounds of unexploded ordnance including rockets, surface to air missiles, and artillery rounds, were ignited by the fire that the initial impact caused. While the area was being evacuated, I saw another rocket hit several homes in the neighboring village."

Paul and his medic chose to drive through the impact area to look for casualties while large bombs exploded and shrapnel landed around them.

Paul said he would never forget the intensity of that day, the heat from the fires, and the sheer volume of explosions. "A Bradley Fighting Vehicle had been struck by a rocket and the track commander was wounded," Paul said. "Since there were still exploding rockets and bombs, we knew that a helicopter could not land or fly over the area."

The two Soldiers decided that they were the only ones that could help the crew so they drove back through the impact area in order to rescue the casualty. More than once they needed to maneuver the HUMVEE to avoid the incoming rounds. Once they safely secured and treated the wounded Soldier, the two evacuated him out of the area.

The recommendation for then-1LT Paul's medal states that "as the rocket fire became more intense, Paul continued to move into the danger area without regard for his own safety. He had to position his ambulance several times in the path of oncoming rockets in order to accomplish this mission. Still under threat of fire, Paul treated the wounded Soldier in the field and during evacuation."

That is precisely what the Soldier's Medal was designed to acknowledge. Established by an Act of Congress in 1926, the medal honors a Soldier who distinguishes himself or herself by heroism that involves personal hazard or danger and the voluntary risk of life.

Before deployment to Iraq, Paul served in Afghanistan with the 3rd Special Forces Group (Airborne). There he helped set up Medical Civil Action Programs, or MEDCAPs, in villages to help treat Afghans and build relations with them. Paul took it upon himself to do the same thing in Iraq and worked closely with Civil Affairs personnel. "The need was obvious and the MEDCAPs did nothing but create goodwill in both Afghanistan and Iraq," he said.

Paul feels like he made a difference in both countries and said he would go back, taking lessons he learned on the ground in both Operations Enduring Freedom and Iraqi Freedom.

"I learned how essential a global positioning system is," he said. "Without it on May 7, I could not have located the casualty. I also learned how vital it is to ensure your radio is properly maintained and set to the right frequency."

Paul also saw the value in teaching combat lifesaver skills to Soldiers.

"Being flexible and prepared for anything in combat is critical," Paul said. "In the blink of an eye things can go from calm to chaos. Lead by example, trust your training, and you will do well."

## Some trauma centers open their doors to a group of military medics

7/15/2004 Medstar.com
http://rdu.news14.com/content/headlines/?ArID=51281&SecID=2

They're part warrior and part healer.

Now Special Operations combat medics, folks like the Navy SEALS and Army Rangers, are getting hands-on experience before being deployed overseas.

"This is their last first best chance to get hands on experience," Kevin Ward MD said.

"The one thing they need before being deployed is good clinical experience and the best probably that can probably be done is for them to get their experiences at a very busy urban level one trauma environment," he explained.

Training at their learning centers is intense. When these men are deployed they'll likely be the only persons within a hundred miles with any medical skills.

Dr. Ward said, "These guys are taught to improvise, to take the aggregate of all their experiences and put them to the patients' benefit out in the field."

The fact that these medics will be working in less-than-ideal surroundings has not gone unnoticed.

SGT Michael Piscopo said, "I was in the OR a couple of days ago and I was intubating a patient and the doctor was like 'well in a case where a guy's got burns or this or that and you're in a helicopter and you've got to do this or you're in a trench' and he was teaching me different ways that instead of hyper extending the neck to open up the airway so I can get a good view would be to just different angles and different blades I could use for some of the equipment to open up his airway put the ET tube in, and I was like wow."

Teaching hospitals like the Virginia Commonwealth University are training these medics for free.

"We felt obligated this is our small contribution to the war on terror. Anything we can teach these young men in order to save lives later we're happy to do," Dr. Ward added.

The increased American military presence overseas is also increasing the need for these Special Operations medics.

Accommodations are already being made for more training sessions. The medics' training includes such wide ranging topics as dentistry and baby birthing since they'll likely also be serving the local civilian population wherever they're deployed.


The following two commentarys are in regards to "The Esophageal-Tracheal Combitube -- A review of the device and its application in the SOF environment" article on page 29.

## Emergency Airway Access - Combitube® ?

This issue of *JSOM* includes an article by Hesse *et al*. on the benefits of the esophageal-tracheal Combitube® in special operations trauma care. The authors describe several studies showing it to be relatively safe and effective in the operating room and pre-hospital environments. As the authors point out, it nearly always goes into the esophagus, and when it doesn't, the operator only needs to recognize that fact and switch lumens to ventilate.

The devil is in the variables.

First, *Rosen's Emergency Medicine*, Fifth Edition (2002) states, "The Combitube® has virtually no role as a primary airway management device, except in cardiopulmonary arrest when expertise for ET intubation is not available, as in some prehospital care systems."

Before we deviate from accepted practice by advocating a change in anything as important as airway management devices, we need to be sure we look at the conventional literature and standards, and then carefully measure the device's performance against likely SOF applications, which can be quite different.

First, SOCM medics are trained to perform endotracheal intubations (endotracheal tube, ETT) by direct laryngoscopy as their standard intervention to secure and protect the airway. JSOMTC teaches the Combitube® in Advanced Cardiac Life Support (ACLS); but in trauma training, we maintain that a surgical open cricothyrotomy is rescue airway intervention of choice. Hence, all graduates of SOCM are qualified at direct laryngoscopy ETT, Combitube® and cricothyrotomy.

Should SOF medics rely more heavily on the Combitube®?

The authors point out that confirmation of Combitube® placement – for the sake of certainty – requires a bulb syringe device, or an end-tidal $CO_2$ monitor, *plus* a pulse oximeter. Although most SOF medics may have a pulse oximeter, they may not have an aspiration bulb syringe (esophageal detection device, EDD) and they likely will not have an end-tidal $CO_2$ monitor. In any event, they do not like to have to rely on delicate instruments, because batteries fail, LCD screens crack, and dust and temperatures ruin circuits.

Not all patients in SOF operations who need an airway are unconscious and unresponsive. And if the patient is unconscious, in most tactical settings a nasopharyngeal or oropharyngeal airway will suffice until more definitive airway evaluation and management is possible.A medic cannot force or finesse a Combitube® down the throat of a conscious patient; but with care and finesse, he can often slip an ET tube into position in that patient. As a temporizing measure, sitting the conscious airway trauma patient up and leaning him forward may keep the airway patent.

The gold standard for placement of an ET tube is not an instrument reading, it is a re-look with laryngoscope. Since you had a laryngoscope with you to place the tube, you will still have it with you after tube placement to verify the tube went through the cords.

There is another train of thought to recommend the Combitube®, however; one which was advocated by MSG Rob Miller of the 75th Ranger Regiment. In a direct action mission, when the casualty needs an airway, a Combitube® will serve because it is quick to place, requires no additional instruments (a difference of opinion from the authors), and a 90-plus percent successful blind placement rate is "Ranger-acceptable" given the need for combat speed and lightness of load.

I have some real-world experience with the Combitube® that tempers my enthusiasm. First, I once consulted on a risk management (i.e., lawsuit) case in which EMTs placed a Combitube® in a post-seizure respiratory arrest patient. The EMTs met *minimal* resistance and tried to overcome it. The patient had swallowed a partial dental plate during his seizure, and the Combitube® insertion caused the false teeth to perfo-

rate the esophagus. The patient died on a ventilator in 36 hours. Cause of death: mediastinitis leading to sepsis.

Second, I have noted that most emergency physicians (and one anesthesiologist I directly observed) have little first-hand experience with the Combitube®, and cannot remove it appropriately for exchange with ETT when the patient arrives.

Third, every Combitube® I have removed or seen removed had large amounts of gastric contents and a great deal of gastric pressure from air leak around the cuff. The flood of gastric sewage is a big management problem.

In SOF, perhaps more so than in other "pre-hospital" categories, time to definitive care may be prolonged. The Combitube® has proved itself useful on the streets and in the operating room for short cases — but is it a good idea for the guy with severe weight limitations to carry one in his limited bag space, instead of an ETT and laryngoscope?

Considering the size of the Combitube® packaged kit (tube and syringes), plus an aspiration bulb syringe or end-tidal $CO_2$ monitor, a medic gets more flexibility with an ET tube and laryngoscope. Add a scalpel blade and a couple lightweight instruments, and you have your "cric" kit.

I would hate to have a cricothyrotomy, but I would *really* hate it if the medic's only cric tube was a Combitube®.

The Combitube®, then, is a valuable third option in SOF airway management; but in most cases it should supplement, not replace, ETT and cric sets.

If you have the weight and space allowance, you may do well to carry a Combitube® along with your ETT.

Warner Anderson, MD

## Commentary -- The Esophageal-Tracheal Combitube -- A review of the device and its application in the SOF environment

I found this article to be very well researched with in-depth references. The article includes a detailed and thorough review of the ETC. Most SOF providers have some familiarity with this device, so I would have liked to see more emphasis on why it needs to be added to SOF rucksacks.

The part detailing how to auscultate in first part of the paper presents problems in the SOF environment. Placement will most likely be in the esophagus. How should the SOF tactical provider confirm placement? Esophageal Detection Device (EDD) followed by calometric paper sounds like the most appropriate means in the low light, high noise environment. Maybe another means needs to be developed. I would not count on a pulse oximetry.

There are some additional questions the authors could have addressed. What types of injures in the SOF environment require intubation? What type of patients would tolerate this airway without sedation and/or paralysis? Many of the studies quoted discuss this device in the context of the failed RSI. Does this mean it is a good airway for SOF? More relevant to the training and skill retention of this device are the studies quoted in "ECT during cardiac arrest". These studies concerned nurses and paramedics using the device for emergency airway management without RSI in code situations; however, the patients were mostly in cardiac arrest. Are patients in cardiac arrest likely to be salvaged on the battlefield?

What are the points that make this device superior for the SOF environment? The LMA is not a secure airway and it does not protect against aspiration. Does the ETC protect against aspiration? Has that been studied? You cannot give positive pressure ventilation with the LMA, whereas you can with the ETC.

The section on use in facial bleeding is interesting and could be applicable to SOF; however, once again many of these were failed RSI pts. Without the ability to perform RSI, why would a SOF medic attempt the ETC over a cricothyroidotomy in a patient with facial trauma and airway difficulty in a field environment? Under what circumstances should the ETC be attempted before a cricothyroidotomy?

The discussion on using the ETC as a "bridge" before a cricothyroidotomy is interesting. Under what circumstances would this be useful? If the ETC is a secure airway and can be left in place for eight hours, why would one place an ETC and then perform a cricothyroidotomy?

In summary, I agree that the ETC may be superior to the LMA and ETT in the tactical environment. I think that the case for this device over others may be made stronger if the above questions and issues are addressed. Additional research and case reports from SOF providers who have used this device successfully will be helpful in resolving these issues.

Bob Mabry, MD

# JOURNAL OF SPECIAL OPERATIONS COMMAND READERSHIP SURVEY

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# An Internist looks at SOF Hydration

Warner Anderson MD

Hydration is – as every SOCM knows – a key component of field performance. However, every year a few good soldiers die from lack of hydration, or over-hydration. How do we find the balance?

The problem is, no one is quite sure. When Dr. Robert Cade invented GatorAde® at the University of Florida over thirty years ago, it seemed like a logical extension of his training as a kidney specialist. You take some sodium and chloride to replace sweat losses, and mix in some sugar to fuel active transport across the gut and speed up absorption. That way, the athlete is not drinking free water, which can cause osmolality problems ("water intoxication"; no, don't try it at home!). So, the water he does get with a sports drink is balanced with electrolytes and enters the circulation faster.

How did Cade arrive at the formula? Well, Cade was a true genius who, in addition to being chief of nephrology, was also a concert violinist, automobile (Studebaker) rebuilder, and inventer. He wanted to invent an oral fluid that would replace sweat losses of water and electrolytes. Since the essence of genius is simplicity, I'm guessing he tasted sweat, then decided to make a beverage that tasted pretty much like sweat with fruit flavor.

Interestingly, a number of people I've talked to say that GatorAde® only tastes good when you need it. There's probably a wisdom of physiology in that phenomenon. You recognize what you need.

One size hydration formula does not fit all. First, the sugar in GatorAde® does little to replace fuel. When you are running, cycling, swimming, or rucking long distances, your glycogen and fat consumption are far in excess of the amount of calories any sports beverage is going to replace. That is the job of Power Bars® and similar sports bars.

Most people find that endurance events, or missions, require the GatorAde® be diluted. It seems to work just as well if diluted to one-half or one-third of the factory-recommended strength.

Other companies make sports beverages which they claim work the same or better. Many are merely reflections of the original product, but one company uses a different carbohydrate substrate: rice water (CeraSport®). The advantage they claim – and it passes the common sense test – is that the complex carbohydrate in rice is easily digested, but since the molecules are larger, the osmotic load on the athlete's gut is much less. Their advertised osmolarity is less than 120 mmol/liter, versus the body's 280 mmol/liter normal. Of course, their comparison is to full-strength GatorAde®, not the home-diluted concoction. Cost comparison seems to favor GatorAde®, so if you're buying it yourself, and you don't have cramping or dumping during your runs ("the runs during the runs"), go with the cheaper product. On the other hand, if you always have to stop to dump in the woods, or you get abdominal cramping, the rice-based beverage may be just the ticket.

A completely different oral beverage approach, Cytomax®, claims that its formula, based upon a proprietary compound they call alpha-L Polylactate™ , extends aerobic metabolism. Supposedly, it prevents muscle cramping and exhaustion by fueling the muscles directly, increasing oxygen delivery by 11%, and so on. They claim less "burn" the next day and faster recovery. The company seems to have marketed to cyclists and power lifters. Claims like these are hard to verify to standards of scientific proof. Such studies are often funded by the company itself, and subject to interpretation. My personal opinion, based upon pretty extensive use: try it for a fourteen-mile run, but save your money on shorter runs. Does it make me feel better because it's just the right formula, or is it because it's just the right placebo?

All of these beverages, with the possible exception of Cera-Lyte® (a special formulation of Cera-Sport®), are downright *bad* to use in diarrheal illnesses. These dehydration cases should receive WHO oral rehydration formula (ORF), preferably as revised in 2002 (less solute load than the old ORF). In fact, as most SF and SEAL

medics know, cholera is classically described as “rice-water” diarrhea. This rice-water characteristic indicates the slightly cloudy appearance. It also makes a good mnemonic for the treatment – rice water with a little table salt.

Most pediatric diarrheas, importantly, do not have large sodium replacement requirements. Pedialyte® and similar purpose-specific preparations are the safest alternative. Fluid replacement for ill patients is beyond the scope of this article – the important point is, dehydration is different in health and illness and athletic practice does not transfer well to clinical practice.

The Special Operations Forces Medical Handbook states that, with ambient temperatures at or over 82 degrees, service members require one liter of water hourly during hard work, with an hourly work/rest cycle of 30 minutes. Thus, an eight-hour day can easily require eight liters of water, even in moderate temperatures. Current doctrine recommends electrolyte replacement by eating two full MREs a day, using all the salt in the packets. Despite this nutritional support, eight liters of free water a day is a lot of free water, and seems like a roadmap to water intoxication (hyponatremia), even if total body water is decreased by the sweat load.

Electrolytes which appear in smaller amounts in perspiration, such as potassium, calcium, and so on are of little concern in oral rehydration for endurance. The body stores these in huge amounts intracellularly or in bone tissue. Certainly, a small amount of potassium in a sports drink is not a bad thing, but it’s usually not of any real use.

An endurance athlete in an austere area can make a reasonably adequate rehydration fluid by using two to three liters of water, one-half teaspoon of table salt, a small pinch of sodium bicarbonate (if available), and a packet of MRE fruit-flavor beverage powder. This will supply sodium, chloride, a bit of bicarbonate, and some sugar to fuel the transport. There is little real science to this, because homeostasis provides – in a healthy person – strong mechanisms for retaining sodium when there’s not enough, and excreting it when there’s too much. The lane markers for intake concentrations are pretty wide as long as the athlete applies these general guidelines.

Remember, the basic premise of internal medicine is, “If they have too much, you take some out; if they don’t have enough, you put some in.”


# Larry Maysey Veteran's Memorial

Thank you to Jim Morris for keeping the JSOM informed of special SOF events. The complete story of this event will be featured in the *Dedication* section of the Spring 05 JSOM.

Larry Maysey was in the elite Aerospace Rescue and Recovery Service (ARRS). The self-sacrificing pararescuemen are affectionately known as the PJs (para - jumpers). He was 21 years old when he shipped out to the Republic of Vietnam in the fall of 1967. He died 9 November 1967; he had been in country only 23 days.

Sgt Maysey was killed in action during a rescue of a Special Forces team that was discovered and took heavy casualties during a savage fire fight. Two Air Force helicopters from the 37th ARRS at Danang Airbase, "Jolly Green 26" and "Jolly Green 29," were scrambled for the desperate night extraction. Sgt. Larry Maysey was the rescue specialist aboard Jolly Green 26. Jolly Green 29 swooped in first; the steep angle of the hill required incredible airmanship but they were able to pick up three of the indigenous operatives before being damaged and driven off by automatic weapons fire.

Jolly .Green 26 rumbled in next. The hostile fire was more concentrated now but Jolly 26 hovered unflinchingly as Larry Maysey dropped down into the maelstrom like a sitting duck. Exposing himself to a "hail of fire," Sg. Maysey stabilized two of the wounded survivors and got them loaded onto Jolly Green 26. Just as Jolly 26 began to pull away, the helicopter was raked by machinegun fire at "point blank range." The mortally wounded Green Giant rolled over and burst into flames as it crashed to the ground. Sgt. Larry Maysey was dead, along with the two Special Forces operatives. Bad weather and heavy enemy fire prevented the recovery of the remains of Larry Maysey and the men that died along side him had to be left behind.

Several of Larry's friends thought about the selfless and tragic loss of their classmate and decided to dedicate a monument in Chester, New Jersey, that bears the hometown hero's name. They decided that whether his remains were recovered or not, they were going to "bring Larry home." They formed a committee to spearhead the building of a memorial to Larry Maysey and all of Chester's veterans. The architect for the project, John Dean is even a classmate of Larry Maysey. They hope to dedicate the monument, which will sit on a small island of grass in the center of Chester Borough, on *Memorial Day, 30 May 2005.* The Marines are providing the Honor Guard and the New York Air National Guard is providing aircraft support for the fly by.

The committee is vigorously trying to raise funds. When complete, the memorial will include a curved black granite wall inscribed with the names of all of Chester's veterans from the Revolution to the present. In front of the wall, a bronze likeness of Larry Maysey will stand on a three-foot high base. Larry will be wearing his jump boots and red beret, with an M-16 slung over his shoulder. The figure will be stooped over with his hand outstretched to passersby, a symbolic gesture of hope and comradeship that is as poignant today as it would have been in 1967. It is a reminder of the generations of young men and women who have faced death so that "others may live." The Pentagon agreed to help with publicity on the national level, which will hopefully bring in donations. The estimated cost of the monument is $200,000.

If you would like to help “bring Larry Maysey home.”

You can send your tax-deductible donation to:
The Larry Maysey Veterans’ Memorial Fund
PO Box 823 Chester, NJ 07930

The architect for the project, John Dean is even a classmate of Larry Maysey.

## SOMA 2004 Update

I hope that all of you had a great holiday season regardless of where you were. While everyone or at least most of us want to be home with our families, "deployment holidays" have a special meaning and special memories (and not all of them good).

SOMA 2004 was a great success. We had over 650 attendees, a great set of speakers, and great support from our vendors. It takes a lot of effort to put this conference on and the SOMA officers, board, and program committee are always looking for good ideas and help. If you attended and are convinced that you know of a way to make the conference better, don't sit in silence or worse, just complain. Let us know and help us make it better.

We had great opening talks by U.S. Surgeon General, VADM Carmona, and the U.S. Navy Surgeon General, VADM Donald Arthur. The Combat Medical Module "breakout" was a success at all levels with great NCOs talking about the challenges of front-line combat health care.

Elections were held and Russ Justice was reelected treasurer (as if someone else wanted the job) and Sammy Rodriguez, also at USASOC, was elected the military Vice President.

Mess Night was extremely successful and meaningful as the USASOC Medic of the Year, SSG David Glenn, was joined by his team. Congratulations to MSgt Matthew Wells, AFSOC Medic of Year and HM1 Dale Wooden, SEAL Team 2, NAVSPECWARCOM Medic of the Year.

Best wishes and best of luck in the New Year.


*USASOC Medic of the Year, SSG David Glenn, was joined by his ODA, Company CO, and SGM.*


*Left to right are the "Medics of the Year" for USASOC - SSG David Glenn; NAVSPECWARCOM - HM1 Dale Wooden; and AFSOC - MSgt Matthew Wells.*


*Bill Merrill (on left) from the UK's National Crime Squad presents an official plaque to Bill Bograkos after delivering a talk on "TEMS to UK Police Firearms Units" at SOMA in December 2004*

# Tactical Element Courses

## 2005 Training Courses, Dates, and Locations

### Tactical Emergency Medical Operator

**21-25 MAR 05**
Camp Navajo
Bellemont, Arizona

**18-22 APR 05**
Land Force Central Area Training Centre-Meaford
Meaford, Ontario

**8-12 AUG 05**
Butler County Community College
Public Safety Training Facility
Butler, Pennsylvania

Tactical Emergency Medical Operator (TEMO) is a five day program of instruction preparing law enforcement officers, security specialist, fire fighters, and emergency medical services personnel assigned to and/or supporting law enforcement and/or military special operations in a multitude of urban, rural, austere, and remote environments. TEMO targets operators and support personnel of tactical operations or special operations teams, delivered in 48 hours of day and night operations comprised of classroom lecture and practicum, followed by field training exercises. TEMO continues forward regardless the weather. How you train is how you perform!

Course topics include but are not limited to:

· Advanced Airway Techniques
· Anti-Personnel Devices (including Improvised Explosive Devices)
· Aspects of Wound Ballistics
· Tactical Operations (TACOPS)
· Command and Control (C2)
· Tactical Operations
· Urban Combat Skills
· Rural Combat Skills
· Medical Force Protection
· Role and Responsibilities of the Tactical Emergency Medical Operator
· Load-out and Equipment Considerations
· Mission Development
· Pre-Mission Medical Threat Assessment
· Remote Assessment / Remote Mentoring
· Tactical Combat Casualty Care

## Protective Operations Medical Specialist

**3-7 OCT**
Butler County Community College
Public Safety Training Facility
Butler, Pennsylvania

Protective Operations Medical Specialist (POMS) is a 40-hour program of instruction preparing medical personnel to address casualty care in the protective operations environment conducive of domestic environments and international.

This course was specifically developed as a result of actions encountered by Operator/Medics of Tactical Element while on assignment in Iraq and to prepare personnel desiring to deploy to protective operations teams.

The severe lack of resources available to protective operations personnel adds an incredible burden to the already dangerous conditions encountered by teams as they are tasked with protecting executive principals and assets. This forces the prospective protective operations medical specialist to prepare for the worst possible conditions.

The student will experience intense training in both non-tactical and tactical environments as it applies to protection and casualty care of principals, team members, and mass casualty (MASCAL) incidents.

Course objectives include but are not limited to:

· Medical oversight
· Protective operations medical support
· Load-out and equipment considerations
· Security advances
· Route surveys
· Pre-mission medical threat assessment
· Travel medicine
· Ballistic wounding
· Tactical combat casualty care
· Casualty extraction and evacuation (CASEVAC)
· Entry and exit drills
· Case studies

## Wilderness EMT-(WEMT) Upgrade

**28 MAR-1 APR 05**
Federal Bureau of Prisons
Federal Correctional Institution
Estill, South Carolina

WEMT upgrade is a nationally recognized 40-hour program of instruction course for those are already EMT or Paramedic certified.

The EMT upgrade program of instruction builds on EMT training and adds wilderness concepts and skills, with many field training exercises. Students are expected to minimize the need for lecture by studying and preparing thoroughly for each class. Wilderness EMT may also be taught as an add-on module to a regular EMT course.

Review and challenge courses for Wilderness First Aid and Wilderness First Responder may be offered for those who have already trained to that level and need to re-certify.

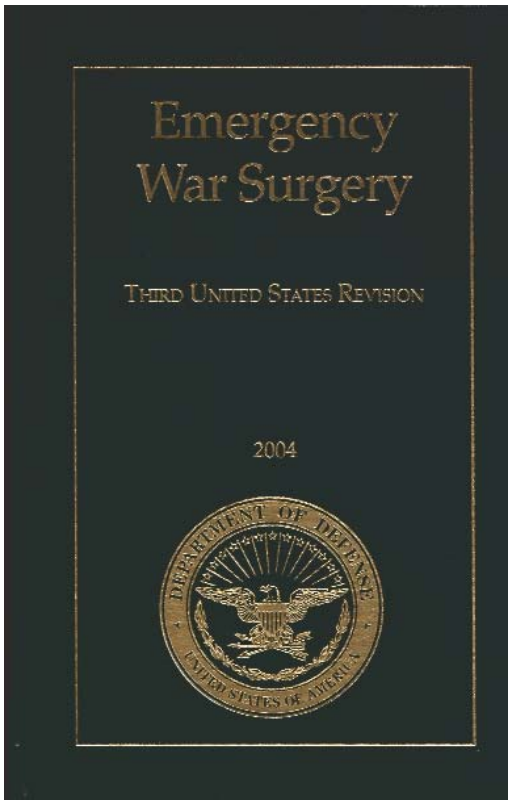

UNCONVENTIONAL WARFARE
UNCONVENTIONAL MEDICINE

# Book Review

## Emergency War Surgery

Third United States Revision – 2004

Review by Mitch Myers, MD, MPH




Just released in December of 2004, the 3rd U.S. revision of the classic handbook *Emergency War Surgery* (*EWS*) is a welcome and long overdue upgrade of this widely-read manual. First published almost half a century ago in 1957, this handbook served as a reference for military surgeons, built on lessons learned in the field during World War II and the Korean War. Three decades later, the second edition of the EWS NATO Handbook provided medical lessons learned during the war in Vietnam. Due to its wide circulation, military physicians all around the world used it. Now, aggressive dissemination of this newest edition will pass on new pearls of field medical wisdom gleaned from Soldier-medics in hotspots all over the globe during the last two decades of armed conflict, military operations other than war (MOOTW), and various deployments.

More than just an update reflecting changes in doctrine, technology, and equipment, this edition differs from its predecessors in several significant ways. The most obvious is the format and style of writing. This edition is more user-friendly and contains less verbal logorrhea. Throughout the pages this version emphasizes important words, facts, concepts, etc., by using bold letters and brief "just the facts Ma'am" textboxes. The bulleted format helps emphasize key points and keeps the message brief so the reader does not have to sift though numerous paragraphs to find tidbits of useful information scattered here and there. In the aftermath of the Abu Ghraib scandals, it also contains a chapter on the medical care of enemy POWs, detainees, and internees. An appendix devoted to medical ethics for healthcare providers details principles of how to protect prisoners against torture and other cruel practices.

This EWS is a collaborative effort of the Borden Institute and the AMEDD Center and School, dedicated to the "Combat Physician." Written with the intent that given a choice of bringing a single book on any deployment, this would be *the* trauma book a military surgeon would want. Therefore, it is probably most useful for physicians and other independent healthcare providers working at level II-III military treatment facilities where resources are available to carry out trauma surgery with somewhat robust logistical, lab, nursing, and evacuation support to the next level of care. Although perhaps best suited to that application, it has much to offer medics at all levels. Even a SOF medic working in remote regions under austere conditions will find plenty of useful information on surgical procedures, triage, environmental medicine, MEDEVAC, and the medical management of NBC casualties. It could even be handy during proficiency training on surgical or emergency medicine rotations in ultra-modern hospitals with a Level I trauma center.

Some of the more interesting pharmaceutical information included: oral ethanol is the drug of choice for anesthesia during whirlpool baths while treating frostbite; Viagra increases exercise tolerance at high alti-

tude. Although not on our field formulary, these drugs appear to be widely available in our units. To its credit, this handbook illustrates how we can improvise in the field to overcome logistical hurdles.

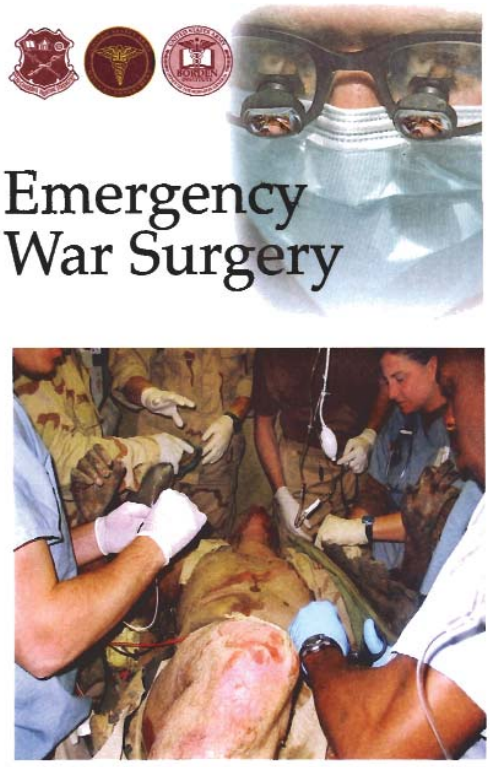
This portable handbook has 436 pages with 34 chapters, 110 illustrations, and numerous small tables covering a wide spectrum of topics relevant to the practice of military medicine. Naturally, a book this size cannot encompass the military *Index Medicus*. For brevity, it does not even contain a glossary or guide to acronyms. I was disappointed that it gives so little attention to regional blocks or the use of parenteral ketamine for anesthesia during brief surgical procedures. An ACLS algorithm would be useful, and despite recent de-emphasis on administering IV resuscitation fluids early to trauma patients on the battlefield, the brief chapter on vascular access should contain more detail.

I was also dismayed that for a book that is just hot off the press, it includes no mention of the use of the fourth generation fluoroquinolone, gatifloxacin. SOF medics from the 96th CA BN and others students found that the Tactical Combat Casualty Care training emphasizes the use of this prophylactic oral antibiotic early for almost all open combat wounds. Furthermore, the Combat Wound Pill Pack that all of our warfighters deploying to a combat zone may soon receive includes gatifloxacin along with acetaminophen.

Admittedly, this book is somewhat rough about the edges, demonstrated by occasional spelling and grammatical errors. The book also fails to ensure consistent use of current terminology, e.g., replacing the older term "echelons" of care with the now preferred "levels" or "roles" of care. However, considering the urgency to get this book printed and putting its useful information in the hands of grunts on the ground, it is easy to overlook these minor shortcomings.

Overall, I rate this a timely and very valuable update of a classic handbook on military field and trauma medicine. I suggest JSOM add it to its recommended reading list, and that all SOF medics put it on their professional reading list. Take it to the field when you deploy as a companion or supplement to the Special Operations Forces Medical Handbook.

Like many of the best things in life, EWS is free to all members of America's armed forces and available through the Borden Institute's website (http://www.bordeninstitute.army.mil/) in a variety of formats that include hardcover copy, Adobe Acrobat, MS Word, and HTML files. The electronic forms fit neatly into any carry-away bag with an electronic device that can read one of the above formats. It may also appear now on the *Textbooks of Military Medicine* series CD-ROM. Civilians may purchase it for $37 from the Government Printing Office.



# SOF RELATED BOOK LIST

The following is an compiled list of SOF related books recommended for your reading by those that were there. The list is complements of Len Blessing with the assistance of all of you. If anyone has other books they would like to add to the list, let us know. I have not read each selection personally. Its intent is to present a concise list of the vast array of reading material available that pertains to the mission of Special Operations - both past and present.

Every attempt is made to maintain the list's integrity with respected and legitimate works. Readers who feel a selection does not merit inclusion are encouraged to contact me with disputes. I also strongly encourage readers to write a short review for the books they have read and/or have personal first hand knowledge concerning a specific selection. This will help maintain a high degree of content validity.

I am happy to submit your comments/reviews on your behalf if you prefer to not write directly to the JSOM editor staff. I can be contacted at lenblessing@comcast.net.
Len Blessing

| TITLE | AUTHOR |
|---|---|
| 00:19:57 | Dave F Stafford |
| A Concise History of US Army Special Operations Forces, with Lineage and Insignia | Geoffrey T Barker |
| A Tear For Somalia<br>(Written by a Brit who married a Somali woman while serving as a member of the British Camel Corps after the end of WWII. Not a history, but it does give insight into Somali society.) | Douglas T Collins |
| A Very Short War<br>(About the last gunfight and the last sacrifices of the Vietnam-era war in the recovery of the crew and ship SS Mayaguez in 1975.) | John F Guilmartin Jr |
| About Face | David H Hackworth (Col) |
| Advice and Support: The Early Years | Ronald H Spector |
| Airborne and "Special Forces"<br>(non-fiction, good quick references, especially for family or civilians) | Hans Halberstadt |
| American Guerrilla<br>(WW II US led guerrillas in Phillipines) | Unknown |
| Band of Brothers<br>(A great story about "E" Company, 506th PIR, 101st ABN Division in WWII.) | Stephen Ambrose |
| Battle for the Central Highlands: A Special Forces Story | George E Dooley |
| Beyond Nam Dong | Roger Donlon |
| Black Eagles<br>(Fiction) | Larry Collins |
| Blackburns Headhunters<br>(Part of a series of books on the area from Turkey to Tibet. Well researched and an excellent view of the region, its history, and various societies that live within the region.) | COL Donald Blackburn |
| Blackjack -33: With Special Forces in the Viet Cong Forbidden Zone | James C Donahue |
| Blackjack -34 (Previously titled "No Greater Love") | James C Donahue |
| Bravo Two Zero | Andy McNab |
| Break Contact Continue Mission<br>(Fiction) | Raymond D Harris |
| Bunard: Diary of a Green Beret | Larry Crile |
| Che Guevarra on Guerrilla Warfare | Ernesto Gueverra |
| Code Name Bright Light | George J Veith |
| Code Name:Copperhead | Joe R Garner (SGM Ret) |
| Covert Warrior | Warner Smith |
| Danger Close<br>(Non-fiction. SF member charged with murder in a bar fight within 3 days of graduation from the Q Course.) | Mike Yon |
| Edward Lansdale: The Unquiet American | Cecil B Currey |
| Elite Warrior | Lance Q Zedric |

| Title | Author |
|---|---|
| Fighting Men: Stories of Soldiering | Jim Morris |
| Fire Your FPL's | Mike Di Rocco |
| Five Fingers | Gayle Rivers |
| Five Years To Freedom | James N Rowe |
| Flags of our Fathers | James Bradley & Ron Powers |
| Foreign Devils on the Silk Road<br>(Part of a series of books on the area from Turkey to Tibet. Well researched and an excellent view of the region, its history, and various societies that live within the region.) | Peter Hopkirk |
| From OSS to Green Berets | Aron Bank (COL Ret) |
| Ghost Soldiers: The Epic Account of World War II's Most Dramatic Mission<br>(Ranger operation to free POWs in the Philippines) | Hampton Sides |
| Greatest Rescue Mission<br>(Ranger operation to free POWs in the Philippines) | |
| Green Berets At War | Shelby L Stanton |
| Green Berets at War: US Army Special Forces in Asia 1956-1975 | Shelby L Stanton |
| Green Berets in the Vanguard: Inside Special Forces 1953-1963 | Chalmers Archer Jr |
| Guerrilla Warfare: On Guerrilla Warfare | Mao Tse tung |
| Hard To Forget | Steven M Yedinak |
| Hazardous Duty | Jack Singlaub (MG Ret) |
| Hazardous Duty | David H Hackworth (COL) & Tom Mathews |
| Hell In A Very Small Place<br>(Siege of Dien Bien Phu) | Bernard Fall |
| Ho Chi Minh: A Life | William J Durker |
| Hunting The Jackal | Billy Waugh |
| In The Village of the Man | Loyd Little |
| Inside Al Qaeda, Global Network of Terror | Rohan Gunaratna |
| Inside Delta Force: The story of America's elite counterterrorist unit | Eric L Haney |
| Inside the Green Berets: The First Thirty Years | Charles M Simpson III |
| It Doesn't Take A Hero | Norman H Schwarzkopf (GEN Ret) & Peter Petre |
| Killing Pablo: The Hunt for the World's Greatest Outlaw<br>(Read by current SF medic that knows some of the guys involved in getting Pablo; told him that the book is pretty accurate, except what happened in the actual killing.) | Mark Bowden |
| Knights Cross | E M Nathanson & Aaron Bank (COL Ret) |
| Laos: War and Revolution | Nina S Adams (Ed) |
| Like Hidden Fire<br>(Part of a series of books on the area from Turkey to Tibet. Well researched and an excellent view of the region, its history, and various societies that live within the region.) | Peter Hopkirk |
| Logistical Support of Special Operations Forces During Operations Desert Shield and Desert Storm | Donald W Betts |
| Long Shadows<br>(Fiction) | Kent White |
| Lost Crusade: America's Secret Cambodian Mercenaries | Peter Scott |
| Lost Crusader: The Secret Wars of CIA Director William Colby | John Prados |
| Love and Duty | Ben & Anne Purcell |
| MAC-V-SOG Command History Vol. I & II | Charles F Reske |
| Medal Of Honor | Roy P Benavidez |
| Memories Of Maggie: Martha Raye: A Legend Spanning Three Wars | Noonie Fortin |
| Mike Force | LH Burrus |
| Mobile Guerrilla Force: Wth the Special Forces in Warzon D | James C Donahue |
| My American Journey | Colin Powell (GEN Ret) & Joseph E Persico |
| My Secret War | Richard S Drury |
| Night Jungle Operations | Thomas B Bennett |

| TITLE | AUTHOR |
|---|---|
| Night of the Silver Starts: The Battle of Lang Vei | William R Phillips |
| No Surrender<br>(Japanese soldier who evaded capture and survived 30 years in the Philippines; it's a great book about perseverance and commitment to warrior ideals.) | Hiroo Onoda |
| Once A Warrior King: Memories of an Officer in Vietnam | David Donovan |
| One Day Too Long | Timothy N Castle |
| O O T W Target Cuba | Robin Moore & JC Lamb |
| Operation Vulture | John Prados |
| OSS to Green Berets | Aaron Bank (COL Ret) |
| Parthian Shot | Loyd Little |
| Pathfinder: First In, Last Out<br>(A very well written account of Richie Burns' first tour in RVN, during which he provided support to a Mike Force mission, and which describes other activities very similar to SF missions during the war.) | Richard C Burns |
| Peoples' War, Peoples' Army | Vo Nguyen Giap |
| Perilous Options: Special Operations as an Instrument of US Foreign Policy | Lucien S Vandenbroucke |
| Phantom Warriors, Book II | Gary A Linderer |
| Phantom Warriors: LRRPs, LRPs, and Rangers in Vietnam, Book I | Gary A Linderer |
| Prairie Fire<br>(Fiction) | Kent White |
| Presidents' Secret Wars: CIA and Pentagon Covert Operations from World War II Through the Persian Gulf | John Prados |
| Project Omega: Eye of the Beast | Ernie Acre |
| Rangers at War: Combat Recon in Vietnam | Shelby L Stanton |
| Reflections Of A Warrior | Franklin D Miller |
| Rescue Of River City | Drew Dix |
| Return of The Enola Gay | Paul W Tibbets |
| Return With Honor | Scott O'Grady (Capt) & Jeff Coplon |
| Setting the East Ablaze<br>(Part of a series of books on the area from Turkey to Tibet. Well researched and an excellent view of the region, its history, and various societies that live within the region.) | Peter Hopkirk |
| Seven Pillars of Wisdon<br>(Middle East insight) | TE Lawrence |
| SF Bibliography: Collection of articles and other readings with Special Forces topics | Radix Press/Dan Godbee |
| Shadow War: Special Operations and Low Intensity Conflict | HT Hayden |
| Shadow Warriors: Inside the Special Forces | Carl Stiner & Tomy Koltz |
| Sideshow<br>(The US, Khymer Rouge, & Cambodia) | Robert Showcross |
| Silent Birdmen<br>(281st AHC pilot account; Project Delta Ops in Ashau Valley.) | Al Rampone |
| Slow Walk In A Sad Rain | John P McAfee |
| SOG and SOG Photo Book | John Plaster |
| SOG: Volume I, II, III and IV | Harve Saal |
| Soldier Under 3 Flags | HA Gill III |
| Soldier Under Three Flags The Exploits of Special Forces Captain Larry A. Thorne | HA Gill III |
| SPEC OPS: Case Studies in Special Operations Warfare: Theory and Practice | William H McRaven |
| Special Forces 1941-1987 | LeRoy Thompson |
| Special Forces of the US Army | Ian Sutherland |
| Special Forces, the US Army's experts in Unconventional Warfare | Caroll B Colby |
| Special Forces: A guided tour of US Army Special Forces | Tom Clancy & John Gresham |

| Title | Author |
|---|---|
| Special Men and Special Missions: Inside American Special Operations Forces, 1945 to the Present | Joel Nadel & JR Wright |
| Spies And Commandos | Kenneth Conboy |
| Stolen Valor | B G Burkett & Glenna Whitley |
| Strategy and Policy Background Umbrella Concept for Low Intensity Conflict | Alex & Hamilton Booz |
| Street Without Joy<br>(French in Indochina; Good groundwork for SF in Vietnam) | Bernard B Fall |
| Taking The High Ground: Military Moments With GOD | Jeff O'Leary (Col) |
| Talking with Victor Charlie: An Interrogator's Story | Sedgwick D Tourison Jr |
| Tam Phu | Leigh Wade |
| The Barking Deer<br>(Fiction) | Jonathan Rubin |
| The Blood Road: The Ho Chi Minh Trail and the Vietnam War | John Prados |
| The Chindit War<br>(Good section on Merrill's Marauders) | Shelford Bidwell |
| The Company They Keep | Anna Simons |
| The Devil's Brigade | Robert H Adleman |
| The Devil's Guard<br>(A non-SF book; a good read and supposedly historically accurate. Covers the war from the viewpoint of the ex-Nazi's who were in the French Foreign Legion fighting the Viet Minh.) | George R Elford |
| The Dying Place<br>(Fiction) | David A Maurer |
| The Great Game<br>(Part of a series of books on the area from Turkey to Tibet. Well researched and an excellent view of the region, its history, and various societies that live within the region.) | Peter Hopkirk |
| The Green Berets | Robin Moore |
| The Green Berets in Vietnam, 1961-71 | Francis J Kelly |
| The Hidden History of the Vietnam War | John Prados |
| The Last Confucian | Denis Warner |
| The Making of a Quagmire | David Halberstam |
| The Montagnards of South Vietnam | Robert L Mole |
| The New Legions | Donald Duncan |
| The One That Got Away<br>(This is the other half of the Bravo Two-Zerostory [a very good read on human endurance and tenacity].) | Chris Ryan |
| The Politics of Heroin in SE Asia<br>(Essential reference for understanding the Golden Triangle.) | Alfred McCoy |
| The Protected Will Never Know | Leigh Wade |
| The Price of Exit<br>(Helicopter pilot, Lam Son 719 and CCN) | Tom Marshall |
| The Raid | Benjamin F Schemmer |
| The Ravens<br>(The classic about our Bird Dog brothers) | Christopher Robbins |
| The Rescue Of Bat-21 | Darrel D Whitcomb |
| The Road to Arnhem: A Screaming Eagle in Holland | Donald R Burgett |
| The Secret War Against Hanoi: The Untold Story of Spies, Saboteurs and Covert Warriors in North Vietnam | Richard H Shultz Jr |
| The Secret Wars: A Guide to Sources in English, Volume II, Intelligence, Propaganda and Psychological Warfare, Covert Operations, 1945-1980 | Myron J Smith |
| The Sorrow of War: A Novel of North Vietnam<br>(This is a work of fiction with many facts written by a NVA Officer.) | Bao Ninh |
| Tiger the Lurp Dog<br>(Fiction) | Kenneth Miller |
| Tragedy in Paradise: A Country Doctor at War in Laos | Charles Weldon, MD |

| TITLE | AUTHOR |
|---|---|
| Trespassers on the Roof of the World<br>(Part of a series of books on the area from Turkey to Tibet. Well researched and an excellent view of the region, its history, and various societies that live within the region.) | Peter Hopkirk |
| Umbrella Concept for Low Intensity Conflict | Alex & Hamilton Booz |
| Unconventional Operations Forces of Special Operations | Mark D Boyatt |
| Uneasy Warrior | Vincent Coppola |
| US Army Special Forces 1952-84 | Gordon L Rottman |
| US Army Handbook for North Vietnam Dept. of Army: 550-57 | |
| US Army Handbook for Cambodia Dept. of Army: DA Pam: 550-50 | |
| US Army Handbook for Laos Dept. of Army: DA Pam: 550-58 | |
| US Army Handbook for South Vietnam Dept. of Army: DA Pam: 550-55 | |
| US Army Handbook: Minority Groups in the Republic of Vietnam: Ethnographic Series Dept. of Army:DA Pam: 550-105 | |
| US Army Special Operations in World War II | David W Hogan Jr |
| US Special Forces | Peter McDonald |
| Urgent Fury: The Battle for Grenada | Mark Adkin |
| Valley of Decision: The Siege of Khe Sanh | John Prados |
| Vietnam Above The Tree Tops: A Forward Air Controller Reports | John F Flanagan |
| Vietnam in American Literature | Philip H Melling |
| Vietnam Military Lore: Legends, Shadow and Heroes | Ray E Bows (MSG Ret) |
| Vietnam Order of Battle: A Complete, Illustrated Reference to the US Army and Allied Ground Forces in Vietnam, 1961 - 1973 | Shelby Stanton |
| Vietnam Studies: Command and Control 1950-1969 | Maj Gen George Eckhardt |
| Vietnam: A History | Stanley Karnow |
| Vietnam: The Origins of Revolution | John T McAlister Jr |
| Vietnam: The Secret War | Kevin M Generous |
| War Stories of the Green Berets: The Vietnam Experience | Hans Halberstadt |
| War Story | Jim Morris |
| We Were Soldiers Once And Young | Harold G Moore ( LTG) & Joseph L Galloway |
| Who's Who From MACV-SOG | Stephen Sherman |

# Picture This….

Daniel J Schissel, MD
Tina Kinsley, MD

A 39 year old Soldier presents complaining of a recurrent bleeding “bump” on his forehead, present for the last six months. By history, it bleeds, scabs, heals somewhat, and then bleeds again.

**Question 1:**
Using the primary lesion definitions outlined in your SOF medical handbook, how would you describe the morphology of this lesion?

**Question 2:**
What is your differential diagnosis for this pink pearly papule?

**Answers:**

**Question 1:**

Morphology: This asymmetric "bump" of interest is a 6 millimeter dome-shaped, pink pearly papule with central ulceration and overlying telangiectasies.

**Question 2:**

Your differential diagnosis should include basal cell carcinoma, intradermal nevus, and sebaceous hyperplasia. Clues to steer you away from intradermal nevus are the recent appearance of the lesion over the last year and its propensity to bleed without significant inciting trauma. Sebaceous hyperplasia is a lobulated papule, yellowish in color, and typically presents with multiple lesions.

## Basal Cell Carcinoma

### Epidemiology

Basal cell carcinoma (BCC) is the most common cancer of Caucasians, and its numbers are on the rise. In the United States, 1.2 million cases of BCC were reported in 1995, and the lifetime risk for an individual to develop BCC was estimated to be 28 to 33 percent.[1] Certain phenotypic characteristics confer an increased risk of developing BCC; these include blond or red hair, light colored eyes, propensity to burn instead of tan, and having multiple freckles.[2]

### Etiology/pathogenesis

Ultraviolet radiation, especially UV-B, is a well-established cause of nonmelanoma skin cancer. Epidemiological studies suggest that sun exposure prior to age 20 initiates a process of carcinogenesis involving multiple intermediate steps that manifests decades later as a skin cancer.[3] Unlike squamous cell carcinoma, the development of which is related to chronic sun exposure, basal cell carcinoma appears to be linked to severe episodic sunburns in childhood. BCC almost exclusively occurs on hair-bearing skin, with over 80 percent occurring on areas most frequently exposed to the sun, namely the head, neck, and back of the hands.[1]

### Clinical

Basal cell carcinoma is a slow growing cancer that may remain asymptomatic for years. Although most commonly seen on the head and neck, BCC can present anywhere on the body, with the exception of mucous membranes.[4] The most common type seen clinically (70%) is nodular BCC, a firm, dome-shaped papule with overlying telangiectasias and a translucent border with a "pearly" quality. There may be a history of repeated bleeding, ulceration, crusting, and healing. The differential diagnosis is as described previously.

Superficial BCC (10-15%) is another clinical subtype. It is usually found on the trunk and extremities, and presents as a scaling plaque with slightly elevated "rolled" borders. It shows slow, centrifugal growth and may have erosions and crusting within the plaque. Nummular eczema, psoriasis, and squamous cell carcinoma in situ (Bowen's disease) may clinically appear very similar to this BCC subtype. Morpheaform BCC (3%) presents as an indurated area. It resembles a scar, with a firm, "bound-down" texture and a waxy or yellowish color. Stretching of the skin around the plaque may assist in its delineation from the normal surrounding tissue. This tumor type tends to be widely infiltrative within the surrounding skin at the time of diagnosis. What is seen clinically is typically only a small portion of the tumor. Pigmented BCC may be similar to nodular or superficial variants but it contains black or brown pigmentation, which can resemble the clinical appearance of melanoma. This subtype is more common in African American and Hispanic patients.[4,5]

### Diagnosis/Treatment

Clinical suspicion should be confirmed with a histologic diagnosis prior to any definitive treatment. A shave biopsy will provide a specimen sufficient to diagnose most cases of BCC. Inject local anesthesia into the area of concern. If the anesthesia is injected into the dermis, a wheal will be produced, elevating the lesion

from the surrounding skin and thus facilitating its removal. Either a number 15 blade on a handle or a single-edged flexible blade may be used.

The specimen is removed using smooth sawing strokes and placed into a formalin-filled container. Hemostasis is then achieved with aluminum chloride (styptic or liquid drysol), electrocoagulation, or pressure. Plain petrolatum can be applied to the biopsy site and the area covered with a bandage. Cleaning with plain soap and water and redressing the wound in the same fashion should occur daily until the wound has healed by secondary intention.

Failure to diagnose basal cell carcinoma at an earlier stage can result in increased morbidity and require a more extensive surgical treatment. The type of treatment recommended depends on the size, location, and the histologic subtype of the tumor. BCC is rarely life threatening, but if left untreated for years, it may eventually result in significant tissue destruction and disfigurement. However, because of their slow growth rate and negligible metastatic risk, the definitive treatment of BCC can be delayed for a few months provided the biopsy site is accurately marked.[6]

If you're *deployed* and have concerns about a puzzling skin lesion you can email your clinical photos and with the aid of your SOF manual, a concise morphologic description of the difficulty to our Operational Teledermatology site at derm.consult@ us.army.mil. The lesion you describe just may make its way to the next edition of **Picture This…**

**Thanks for all you do.**

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Capt Tina Kinsley is a 2001 graduate of the Uniformed Services University of the Health Sciences. She completed her internship with a transitional year at Andrews AFB, Malcolm Grow Medical Center, in 2002. She then served as a general medical officer in the dermatology clinic for a year at Andrews AFB. In 2003, Capt Kinsley spent her final year as a general medical officer in the emergency department at Osan AB, ROK. She is currently in her first year of residency training in dermatology at Brooke Army Medical Center.



LTC Daniel Schissel is a 1993 graduate of the Uniformed Service University of the Health Sciences. He completed his internship with the family practice department at Fort Bragg in 1994. He then served as the 2/10th Special Forces Group (Airborne) and followed on as the 10th SFG(A) Group Surgeon. He completed his residency training in dermatology at the Brooke Army Medical Center in 1999. LTC Schissel is presently station in Heidelberg, Germany as a staff physician and the European Regional Medical Command Dermatology Consultant. He has authored the dermatology section of the new SOF manual, serves on the USSOCOM Medical Curriculum and Examinations Board, and is the U.S. Army Aviation Dermatology Consultant.

# Photo Gallery

A civil affairs officer and an interpreter look through a stack of medical records at the Ekrema Rehabilitation Center in Baghdad, Sep 04.
*Photo courtesy of SPC Ryan Smith*

A surgeon vaccinates a sheep in Bagram during a Combined Medical Assistance exercise at the village of Rusulkhal. U.S. and Romanian troops from Kandahar Army Airfield, Afghanistan, conduct a CMAX mission where members of the 486th Civil Affairs Battalion, 308th Tactical Psychological Operations Company, 10th Mountain Police Company, and C Med, 10th Mountain Forward Support Battalion set a camp at Marouf valley to provide the villagers with medical care and distribute food supplies, Oct 2003.
*Photo courtesy of SPC Gul Alisan*

A Special Forces medic glazes one of the 17 windows unit members replaced at a school in Afghanistan's Orgun Valley.
*Photo courtesy of SFC Victor Andersen*

An oral & maxillofacial surgeon was the medical commander for a Humanitarian Medical mission (MEDRETE) to Guyana in Jun/Jul 04. He is also on the USSOCOM curriculum and evaluation board (CEB). Show here extracting teeth on a local national.
*Photo courtesy of Lt Col Gary Geracci*

A Colorado ANG Blackhawk air dropping medical supplies to one of the isolated villages visited during the Guyana MEDRETE.
*Photo courtesy of Lt Col Gary Geracci*

An 18D greets Afghan children on a visit to Jangadam, Afghanistan. Soldiers from the Base Defense Operations Center at Bagram Air Field, Afghanistan, gave winter clothing donated by the Healing Hands International organization to the people of Jangadam.
*Photo courtesy of SGT Martin Newton*

# Dedication



## STAFF SGT TONY B. OLAES

Staff Sergeant Tony B. Olaes, 30, was a Special Forces medical sergeant assigned to 2nd Battalion, 3rd Special Forces Group (Airborne) at Fort Bragg, NC. He was killed in action while supporting Operation Enduring Freedom on September 20, 2004, during a combat patrol near the town of Shkin in Afghanistan's Paktika province when his vehicle came under fire from enemy forces.

A native of Walhalla, SC, SSG Olaes enlisted in the South Carolina Army National Guard in 1992 and trained to be a man-portable air-defense system crewmember. He left the military in May 1998 and in 1999 he re-entered the Army on active duty. Olaes trained at Fort Jackson, SC, to be a multi-channel transmissions system operator-maintainer and was assigned to the 35th Signal Brigade (Airborne) at Fort Bragg. He graduated from the Special Forces Qualification Course in 2001 and was then assigned to the 3rd SFG.

SSG Olaes' military education includes the Special Forces Qualification Course, Advanced Special Operations Techniques Course, Jumpmaster Course, Basic Noncommissioned Officer Course, and the Basic Airborne Course.

SSG Olaes' awards and decorations include the Bronze Star Medal, Purple Heart, Army Commendation Medal, Army Achievement Medal, Army Good Conduct Medal, National Defense Service Medal, Global War on Terrorism Expeditionary Medal, Global War on Terrorism Service Medal, Humanitarian Service Medal, Noncommissioned Officer Professional Development Ribbon, Army Service Ribbon, the Combat Medical Badge, Parachutist Badge, and the Special Forces Tab.

Tony dedicated his life to the military. He served his country for 13 years. He was also very dedicated and supportive of his family and his community of Spring Lake, NC. He left behind three boys and a wife who meant the world to him.

- DE OPPRESSO LIBER -

# Taps


John (Jack) Chase, a former PJ, died in an "AIRHeart" helicopter ambulance crash in the Florida Panhandle's Choctawhatchee Bay on October 20, 2004. Jack was 47, and was working for the Sacred Heart Health Systems. The helicopter Jack was working on as a flight nurse crashed while returning to land in bad weather in the Niceville area at 0100; there were no survivors. TSgt John (Jack) Chase was a PJ from about 1976 to 1987 with a break in service from 1981 to 1983.

No one knew the helicopter had gone down until about five hours after crew members radioed emergency dispatchers to report that bad weather had forced them to turn back minutes after taking off from the AIRHeart hangar in Santa Rosa Beach. Thunderstorms were reported in the Florida Panhandle.

The helicopter had been headed for DeFuniak Springs to fly a critically ill heart patient to a Pensacola hospital. A ground ambulance made the transfer after the helicopter aborted its flight.

Dispatchers violated procedure by failing to make sure the Eurocopter BO-105 had returned safely, the director of the Walton County Emergency Operations Center said. Crews are supposed to check with dispatch when they land. If they fail to so after 20 minutes, dispatchers are supposed to contact them, he said.

Even if the helicopter had been reported missing immediately, the crew probably would not have survived due to the severity of their injuries, said Walton County Sheriff's Capt Stan Sunday.

No one noticed the helicopter missing until a relief crew arrived about 6 a.m. CDT and found the hangar empty.

The aircraft is one of two AIRHeart helicopters owned by Metro Aviation Inc. of Shreveport, LA, that Sacred Heart operates in the Florida Panhandle. The two helicopters fly more than 1,000 missions annually in the Panhandle and southern Alabama.

Jack was a true gentleman who put the good of others before himself and always worked for the greater good. His view was selfless and global. He leaves behind a wife and son.

# Journal of Special Operations Medicine


1. Use the active voice when possible. This is our most common editorial problem and often requires extensive re-writes. An example of the active voice is, "An 'action guy' uses the active voice whenever possible." An example of the undesired passive voice is, "The passive voice is used by boring authors whenever possible." In other words, use the sequence "subject - verb - object."
2. Secure permission before including names of personnel mentioned in your piece. Do not violate copyright laws. If the work has been published before, include that information with your submission.
3. Format articles to be single-spaced, eleven point font, aligned on the left and justified on the right.
4. Important: Include an abstract, biography, and headshot photo of yourself as part of the article.
5. Use a minimum of acronyms; spelled out acronyms when first used.
6. Remember that your audience is inter-Service, civilian, and international.
7. Put the point of the article in the introductory paragraph and restate it in the closing or summary. Subtlety is not usually a virtue in a medical publication.
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14. Remember, the JSOM is your journal and servesas a unique opportunity for you to pass your legacy to the SOF medical community.

**Take advantage of the opportunity**

## Special Forces Aidman's Pledge

As a Special Forces Aidman of the United States Army, I pledge my honor and my conscience to the service of my country and the art of medicine. I recognize the responsibility which may be placed upon me for the health, and even lives, of others. I confess the limitation of my skill and knowledge in the caring for the sick and injured. I promise to follow the maxim "Primum non- nocere" ("First, thou shalt do no harm"), and to seek the assistance of more competent medical authority whenever it is available. These confidences which come to me in my attendance on the sick, I will treat as secret. I recognize my responsibility to impart to others who seek the service of medicine such knowledge of its art and practice as I possess, and I resolve to continue to improve my capability to this purpose. As an American soldier, I have determined ultimately to place above all considerations of self the mission of my team and the cause of my nation.

## Pararescue Creed

I was that which others did not want to be. I went where others feared to go, and did what others failed to do. I asked nothing from those who gave nothing, And reluctantly accepted the thought of eternal lonliess ....should I fail. I have seen the face of terror; felt the stinging cold of fear, and enjoyed the sweet taste of a moment's love. I have cried, pained and hoped...but most of all, I have lived times others would say best forgotten. Always I will be able to say, that I was proud of what I was: a PJ It is my duty as a Pararescueman to save a life and to aid the injured. I will perform my assigned duties quickly and efficiently, placing these duties before personal desires and comforts.

## Navy Poem

I'm the one called Doc"...I shall not walk in your footsteps, but I will walk by your side.I shall not walk in your image, I've earned my own title of pride. We've answered the call together, on sea and foreign land. When the cry for help was given, I've been there right at hand. Whether I am on the ocean or in the jungle wearing greens, Giving aid to my fellow man, be it Sailors or Marines. So the next time you see a corpsman and you think of calling him "squid", think of the job he's doing as those before him did. And if you ever have to go out there and your life is on the block, Look at the one right next to you...

I'm the one called "Doc".

~ Harry D. Penny, Jr. USN 

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